

# PLANT INSPECTION WORKSHOP - TECHNIQUES FOR EVALUATING PERFORMANCE OF AIR POLLUTION CONTROL EQUIPMENT

Selected Papers on the  
Legal Aspects of Enforcement



U.S. ENVIRONMENTAL PROTECTION AGENCY  
RESEARCH TRIANGLE PARK, NC 27711

February 1981

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TECHNIQUES FOR EVALUATING PERFORMANCE  
OF AIR POLLUTION CONTROL EQUIPMENT

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Legal Aspects of Enforcement

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A-1

UNITED STATES CONSTITUTION  
Amendments IV, V, VI, VII, and XIV

A-1-3

Amendments to the Constitution  
of the United States

Resolved by the Senate and House of Representatives of the United States of America, in Congress assembled, two thirds of both Houses concurring, that the following Articles be proposed to the Legislatures of the several States, as Amendments to the Constitution of the United States, all, or any of which Articles, when ratified by three fourths of the said Legislatures, to be valid to all intents and purposes, as part of the said Constitution, viz.

Article IV-The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Article V-No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

Article VI-In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of Counsel for his defence.

Article VII-In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any Court of the United States than according to the rules of the common law.

Article XIV (July 28, 1868) - 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

5. The Congress shall have power to enforce by appropriate legislation the provisions of this article.

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B-1

ENTRY TO INDUSTRIAL FACILITIES

Office of General Counsel memo  
November 8, 1972

B-1-3



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460  
OFFICE OF THE GENERAL COUNSEL  
WATERSIDE MALL

NOV 8 1972

Memorandum

To: All Regional Counsels

From: Assistant Administrator for Enforcement and  
General Counsel

Subject: Visitors' Releases and Hold Harmless Agreements  
as a Condition to Entry of EPA Employees on  
Industrial Facilities

FACTS

As a condition to entry on industrial facilities, certain firms have required EPA employees to sign agreements which purport to release the company from tort liability. The following "Visitors Release" required by the Owens-Corning Fiberglas Corporation is an example:

VISITORS RELEASE

In consideration of permission to enter the premises of Owens-Corning Fiberglas Corporation, and being aware of the risk of injury from equipment, negligence of employees or of other visitors, and from other causes, the undersigned assumes all risk, releases said corporation, and agrees to hold it harmless from liability for any injury to him or his property while upon its premises....

READ CAREFULLY BEFORE SIGNING

In addition to such "Visitors Releases" employees or their supervisors have been asked to sign entry permits which include an agreement that EPA will pay for any injury or damage resulting from our activities at the facility.

### QUESTIONS

1. Does signing such a "Visitors Release" effectively waive the employee's right to obtain damages for tortious injury?
2. May EPA employees contractually obligate the Agency to pay for any injury or damage caused by our activities?
3. May firms condition EPA's entry upon signing such agreements?

### ANSWERS

1. Generally, yes; employees waive their right to damages and the government is prevented from exercising its right of subrogation under the Federal Employees' Compensation Act.
2. No; federal tort liability is established and limited by the Federal Tort Claims Act, and such agreements are also invalid as violative of the Anti-Deficiency Act.
3. No; EPA employees possess a right of entry under both the Clean Air Act and the Federal Water Pollution Control Act Amendments of 1972.

### DISCUSSION

Although the precise effect of an advance release of liability for negligence cannot be determined without reference to the law of the state in which the tort occurs, we must assume that such agreements are generally valid. By signing such agreements EPA employees may effectively waive their right to sue for damages and the government's right of subrogation under the Federal Employees' Compensation Act, 5 USC 8101 et seq.

The Restatement of Contracts, Ch. 18, § 575 states:

- (1) A bargain for exemption from liability for the consequences of a willful breach of duty is illegal, and a bargain for exemption from liability for the consequences of negligence is illegal if
  - (a) the parties are employer and employee and the bargain relates to negligent injury of the employee in the course of the employment, or,
  - (b) one of the parties is charged with a duty of public service, and the bargain relates to negligence in the performance of any part of its duty to the public, for which it has received or been promised compensation . . .

With the exceptions mentioned in the Restatement of Contracts, supra, no general public policy seems to exist against express agreements for assumption of risk, and they need not be supported by consideration. 10 Prosser on Torts § 55 and Restatement of Torts 2d, Ch. 17A, §496B. Despite this general rule, cases arising under the Federal Tort Claims Act involving releases signed by civilian passengers prior to boarding ill-fated government aircraft indicate that the courts do not favor such agreements. (Friedman v. Lockheed Aircraft Corp., 138 F. Supp. 530 (1956)--a release is no defense against gross, willful, or wanton negligence in New York; Rogow v. U.S., 173 F. Supp. 547 (1959)--a release is ineffective unless the flight is gratuitous; Montellier v. U. S., 315 F2d 180 (1963)--a release does not destroy a cause of action for wrongful death in Massachusetts.) Such apparent judicial disfavor of advance releases is, of course, insufficient justification for assuming the risk of signing them, and ordinary prudence requires us to assume their validity. Although signing a release does not affect the employee's right to benefits under FECA, such compensation will ordinarily be much less than might be recovered in a tort action against the negligent corporation.

Since the Federal Employees' Compensation Act, 5 USC 8131 and 8132, provides that an employee may be required to assign his right to sue third parties to the United States and that the employee must, within limitations, pay over any recovery from third parties as reimbursement of FECA benefits, the employee's release prejudices the government's rights as well as his own. Employees should therefore be instructed not to sign such releases under any circumstances.

Although an EPA employee's express assumption of the risk of injury to himself may be valid, an agreement which purports to obligate EPA to pay all damages caused by our activities is not. The Federal Tort Claims Act, 28 USC 2674 provides:

The United States shall be liable, respecting the provisions of this title relating to tort claims, in the same manner and to the same extent as a private individual under like circumstances, but shall not be liable for interest prior to judgment or for punitive damages . . .

Congress has granted only a limited waiver of the government's sovereign immunity, and 28 USC 2680 lists exceptions to the

general waiver stated in 28 USC 2674, supra. Exceptions which might be relevant in cases arising out of the actions of EPA employees include 28 USC 2680(a):

Any claim based upon an act or omission of an employee of the Government, exercising due care, in the execution of a statute or regulation, whether or not such statute or regulation be valid, or based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused;

and 28 USC 2680(b):

Any claim arising out of assault, battery, false imprisonment, false arrest, malicious prosecution, abuse of process, libel, slander, misrepresentation, deceit, or interference with contract rights . . .

Since the government's tort liability is limited by statute, an administrative undertaking to expand such liability by contract is probably invalid. In any event, EPA should not create the occasion for judicial resolution of the question.

An additional basis for considering such indemnification agreements invalid is the Anti-Deficiency Act, which provides at 31 USC 665(a):

No officer or employee of the United States shall make or authorize an expenditure from or create or authorize an obligation under any appropriation or fund in excess of the amount available therein.

Since the extent of the government's obligation is uncertain, the Comptroller General has stated that a contractual assumption of tort liability is not a lawful obligation of the United States, and payment may not be made pursuant to such agreements. (7 CG 507, 16 CG 803, and 35 CG 86.) In fairness to companies which may rely upon the validity of such indemnity provisions, employees should be instructed not to sign them.

Inasmuch as the Clean Air Act and the Federal Water Pollution Control Act Amendments of 1972 grant EPA employees a right of entry to corporate facilities, a company may not



lawfully condition the exercise of this right upon the signing of a release or indemnity agreement. The Clean Air Act provides, at 42 USC 1857c--9(a)(2):

. . .the Administrator or his authorized representative, upon presentation of his credentials---(A) shall have a right of entry to, upon, or through any premises in which an emission source is located or in which any records required to be maintained under paragraph (1) of this section are located . . .

The procedure for enforcement of this right is provided in 42 USC 1857c--8:

(a)(3) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of . . . any requirement of section 1857c--9 of this title, he may issue an order requiring such person to comply with such section or requirement, or he may bring a civil action in accordance with subsection (b) of this section.

(b) The Administrator may commence a civil action for appropriate relief, including a permanent or temporary injunction, whenever any person--(4) fails or refuses to comply with any requirement of section 1857c--9 of this title.

When a firm refuses entry to an EPA employee performing his functions under the Clean Air Act, the employee may appropriately cite the statute and remind the company of EPA's right to seek judicial enforcement. If the company persists in its refusal, EPA should go to court in preference to signing a "Visitors Release."

In addition to procedure for judicial enforcement similar to that of the Clean Air Act, the Federal Water Pollution Control Act Amendments of 1972 reinforce EPA's right of entry with criminal and civil penalties. Section 309 states:

(c)(1) Any person who willfully or negligently violates section . . .308 of this Act (Note--Section 308 establishes the right of entry). . . shall be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or by both.

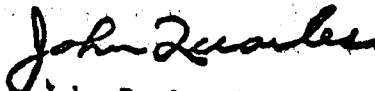
If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(3) For the purposes of this subsection, the term 'person' shall mean, in addition to the definition contained in section 502(5) of this Act, any responsible corporate officer.

(d) Any person who violates section . . .308 of this Act. and any person who violates any order issued by the Administrator under subsection (a) of this section (Note--subsection (a) provides for administrative orders to enforce the right of entry), shall be subject to a civil penalty not to exceed \$10,000 per day of such violation.

In See v. Seattle, 387 U.S. 541(1967) the Supreme Court reversed the conviction of a corporation for refusal to admit building inspectors of the City of Seattle. Justice White held that the Fourth and Fourteenth Amendments required a warrant for such inspections, even where the search was reasonably related to protecting the public health and safety and even where a corporation, rather than an individual, was the subject. Under See evidence obtained by inspectors of the Food and Drug Administration has been held inadmissible where the inspectors obtained consent to enter by threatening prosecution under 21 USC 331, which provides criminal penalties for refusal to permit entry, U.S. v. Kramer Grocery Co., 418 F2d 987 (8th Cir., 1969). Although two more recent Supreme Court decisions, Colonnade Catering Corp. v. U.S., 397 U.S. 72 (1970) and U.S. v. Biswell, 92 S. Ct. 1593 (1972), may create doubt as to whether See retains its original vigor (see Memorandum of the Assistant to the Deputy General Counsel, September 29, 1972), the possibility that evidence obtained under the FWPCA Amendments of 1972 will be ruled inadmissible is a risk EPA need not assume.

Since the Amendments provide for judicial enforcement of the right of entry, EPA employees should be instructed not to mention the civil or criminal penalties of Section 309 when faced with a refusal to permit entry. When such refusals occur, this office should be informed immediately so that a decision can be made as to whether to issue an order of the Administrator under 309(a) or seek an appropriate judicial remedy under 309(b).

  
John R. Quarles, Jr.

B-2

THE BARLOW DECISION

Office of General Counsel memo

Draft policy guidance on conducting plant inspections being prepared by EPA Office of General Counsel. This document has not been officially released or distributed and is being circulated for policy review within the agency at this time.

MEMORANDUM

TO: Regional Administrators  
Surveillance and Analysis Division Directors  
Enforcement Division Directors

FROM: Assistant Administrator  
for Enforcement

SUBJECT: Conduct of Inspections After the Barlow's Decision

I. Summary

This document is intended to provide guidance to the Regions in the conduct of inspections in light of the recent Supreme Court decision in Marshall v. Barlow's Inc., \_\_\_\_\_ U.S. \_\_\_\_\_, 98 S. Ct. 1816 (1978). The decision bears upon the need to obtain warrants or other process for inspections pursuant to EPA-administered Acts.

In Barlow's, the Supreme Court held that an OSHA inspector was not entitled to enter the non-public portions of a work site without either (1) the owner's consent, or (2) a warrant. The decision protects the owner against any punishment for insisting upon a warrant.

In summary, Barlow's should only have a limited effect on EPA enforcement inspections:

- o Inspections will generally continue as usual
- o Where an inspector is refused entry, EPA will seek a warrant through the U.S. Attorney
- o Sanctions will not be imposed upon owners of establishments who insist on a warrant before allowing inspections of the non-public portions of an establishment

The scope of the Barlow's decision is broad. It affects all current inspection programs of EPA, including inspections conducted by State personnel and by contractors. The Agency's procedures for inspections,

particularly where entry is denied, were largely in accord with the provisions of Barlow's before the Supreme Court issued its ruling. Nevertheless, a number of changes in Agency procedure are warranted. Thus, it is important that all personnel involved in the inspection process be familiar with the procedural guidelines contained in this document.

This document focuses on the preparation for and conduct of inspections, including (1) how to proceed when entry is denied, (2) under what circumstances a warrant is necessary, and (3) what showing is necessary to obtain a warrant.

## II. Conduct of Inspections

The following material examines the procedural aspects of conducting inspections under EPA-administered Acts. Inspections are considered in three stages: (1) preparation for inspection of premises, (2) entry onto premises, and (3) procedures to be followed where entry is refused.

### A. Preparation

Adequate preparation should include consideration of the following factors concerning the general nature of warrants and the role of personnel conducting inspections.

#### (1) Seeking a Warrant Before Inspection

The Barlow's decision recognized that, on occasion, the Agency may wish to obtain a warrant to conduct an inspection even before there has been any refusal to allow entry. Such a warrant may be necessary when surprise is particularly crucial to the inspection, or when a company's prior bad conduct and prior refusals make it likely that warrantless entry will be refused. Pre-inspection warrants may also be obtained where the distance to a U.S. Attorney or a magistrate is considerable, so that excessive travel time need not be wasted where there is refusal of entry.



At present, the seeking of such a warrant prior to an initial inspection should be an exceptional circumstance, and should be cleared through Headquarters. If refusals to allow entry without a warrant increase, such warrants may be sought more frequently. (For specific instructions on how to obtain a warrant, see Part D.)

## (2) Administrative Inspections v. Criminal Investigations

It is particularly important for both inspectors and attorneys to be aware of the extent to which evidence sought in a civil inspection can be used in a criminal matter, and to know when it is necessary to secure a criminal rather than a civil search warrant. There are three basic rules to remember in this regard: (1) If the purpose of the inspection is to discover and correct, through civil procedures, noncompliance with regulatory requirements, an administrative inspection (civil) warrant may be used; (2) if the inspection is in fact intended, in whole or in part, to gather evidence for a possible criminal prosecution, a criminal search warrant must be obtained under Rule 41 of the Federal Rules of Criminal Procedure; and (3) evidence obtained during a valid civil inspection is generally admissible in criminal proceedings. These principles arise from the recent Supreme Court cases of Marshall v. Barlow's, Inc., supra; Michigan v. Tyler, \_\_\_ U.S. \_\_\_, 98 S.Ct. 1942 (1978); and U.S. v. LaSalle National Bank, \_\_\_ U.S. \_\_\_, 57 L. Ed. 2d 221 (1978). It is not completely clear whether a combined investigation for civil and criminal violations may be properly conducted under a civil or "administrative" warrant, but we believe that a civil warrant can properly be used unless the intention is clearly to conduct a criminal investigation.

## (3) The Use of Contractors to Conduct Inspections

Several programs utilize private contractors to aid in the conduct of inspections. Since, for the purpose of inspections, these contractors

are agents of the Federal government, the restrictions of the Barlow's decision also apply to them. If contractors are to be conducting inspections without the presence of actual EPA inspectors, these contractors should be given training in how to conduct themselves when entry is refused. With respect to obtaining or executing a warrant, an EPA inspector should always participate in the process, even if he was not at the inspection where entry was refused.

#### (4) Inspections Conducted by State Personnel

The Barlow's holding applies to inspections conducted by State personnel and to joint Federal/State inspections. Because s programs are largely implemented through the States, it is essential that the Regions assure that State-conducted inspections are conducted in compliance with the Barlow's decision, and encourage the State inspectors to consult with their legal advisors when there is a refusal to allow entry for inspection purposes. State personnel should be encouraged to contact the EPA Regional Enforcement Office when any questions concerning compliance with Barlow's arise.

With regard to specific procedures for States to follow, the important points to remember are: (1) the State should not seek forcible entry without a warrant or penalize an owner for insisting upon a warrant, and (2) the State legal system should provide a mechanism for issuance of civil administrative inspection warr enforcing an EPA program through a State statute, the warrant process should be conducted through the State judicial system. Where a State inspector is acting as a contractor to the Agency, any refusal should be handled as would a refusal to an Agency inspector as described in section II.B.3. Where a State inspector is acting as a State employee

with both Federal and State credentials, he should utilize State procedures unless the Federal warrant procedures are more advantageous, in which case the warrant should be sought under the general procedures described below. The Regions should also assure that all States which enforce EPA programs report any denials of entry to the appropriate Headquarters Enforcement Attorney, for the reasons discussed in section II.B.4.

#### B. Entry

##### (1) Consensual Entry

One of the assumptions underlying the Court's decision is that most inspections will be consensual, and that the administrative inspection framework will thus not be severely disrupted. Consequently, inspections will normally continue as before the Barlow's decision was issued. This means that the inspector will not normally secure a warrant before undertaking an inspection, but will present his credentials, and issue a notice of inspection where required, in an attempt to gain admittance. Although the establishment owner may complain about allowing an inspector in or otherwise express his displeasure with EPA or the Federal government, as long as he allows the inspector in, the entry is voluntary and consensual unless the inspector is expressly told to leave the premises. However, if the inspector has gained entry in a coercive manner (either in a verbal or physical sense), the entry would not be consensual.

Consent must be given by the owner of the premises or the person in charge of the premises at the time of the inspection. In the absence of the owner, the inspector should make a good faith effort to determine who is in charge of the establishment, and present his credentials to

that person. Consent is generally needed only to inspect the non-public portions of an establishment - i.e., any evidence that an inspector obtains while in an area open to the public is admissible in an enforcement proceeding.

(2) Withdrawal of Consent

The owner may withdraw his consent to the inspection at any time. The inspection is valid to the extent to which entry was allowed before consent was withdrawn. Thus, observations by the inspector, including samples and photographs obtained before consent was withdrawn, would be admissible in any subsequent enforcement action. Withdrawal of consent is tantamount to a refusal to allow entry and should be treated as discussed in section II.B.3. below, unless the inspection had progressed far enough to accomplish its purposes.

(3) When Entry is Refused

Barlow's clearly establishes that the owner does have the right<sup>1</sup> to ask for a warrant under normal circumstances. Therefore, refusal to allow entry for inspection purposes will not lead to civil or criminal penalties if the refusal is based on the inspector's lack of a warrant and one of the exemptions discussed in Part C doesn't apply. If the owner were to allow the inspector to enter his establishment only in response to a threat of enforcement liability is it quite possible that any evidence obtained in such an inspection would be inadmissible. An inspector may, however, inform the owner who refuses entry that he intends to seek a warrant to allow the inspection. In any event, when entry is

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FIFRA inspections are arguably not subject to this aspect of Barlow's See discussion, p. 8.

refused, the inspector should leave the premises immediately, and telephone the designated Regional Enforcement Attorney as soon as possible for further instructions. The Regional Enforcement Attorney should contact the U.S. Attorney's Office for the district in which the establishment desired to be inspected is located, and explain to the appropriate Assistant United States Attorney the need for a warrant to conduct the particular inspection. The Regional Attorney should arrange for the United States Attorney to meet with the inspector as soon as possible. The inspector should bring a copy of the appropriate draft warrant and affidavits. Samples are provided in the appendix to this document.

#### (4) Headquarters Notification

It is essential that the Regions keep Headquarters informed of all refusals to allow entry. The Regional Attorney should inform the appropriate Headquarters Enforcement Attorney of any refusals to enter, and should send a copy of all papers filed to Headquarters. It is necessary for Headquarters to monitor refusals and Regional success in obtaining warrants so that procedures may be improved and to assess if the impact of Barlow's on EPA inspections, and on all Federal administrative agency inspections, is greater than we expect.

#### C. Areas Where a Right of Warrantless Entry Still Exists

##### 1. Emergency situations.

In an emergency, where there is no time to get a warrant, a warrantless inspection is permissible. In Camara v. Municipal Court, 387 U.S. 523 (1967), the Supreme Court states that "nothing we say today is intended to foreclose prompt inspections, even without a warrant, that the law has traditionally upheld in emergency situations". Nothing stated in Barlow's



indicated any intention by the court to retreat from this position. The Regions will always have to exercise considerable judgment as to when it is impossible to secure a warrant when dealing with an emergency situation. However, if entry is refused during an emergency, the Agency would need the assistance of the U.S. Marshall to gain entry anyway, and a warrant could probably be obtained during the time necessary to secure that Marshall's assistance.

An emergency situation would include potential imminent hazard situations, as well as situations where there is potential for destruction of evidence or where evidence of a suspected violation will disappear by the time a warrant is obtained.

(2) FIFRA inspections.

There are some grounds for interpreting Barlow's as not being applicable to FIFRA inspections. The Barlow's restrictions do not apply to areas that have been subject to a long standing and pervasive history of government regulation. An Agency administrative law judge held recently that even after the Barlow's decision, refusal to allow a warrantless inspection of a FIFRA regulated establishment properly subjected the owner to civil penalty. N. Jonas & Co., Inc., I.F. & R Docket No. III-121C (July 27, 1978). For the present, however, FIFRA inspections should be conducted under the same requirements applicable to other enforcement programs.

(3) "Open Fields" and "In Plain View" situations.

Observation by inspectors of things that are in plain view, (i.e., that a member of the public could be in a position to observe) does not require a warrant. Thus, an inspector's observations from the public area of a plant, or even from certain private property not closed to

the public, would not be ruled inadmissible. Observations made even before presentation of credentials while on private property which is not normally closed to the public are admissible.

D. Securing a Warrant

There are several general rules for securing warrants. Three documents have to be drafted - an application for a warrant, an accompanying affidavit, and the warrant itself. Each document should be captioned with the District Court of jurisdiction, the title of the action, and the title of the particular document.

The application for a warrant should generally address under what statutes and regulations the Agency is seeking the warrant, should clearly identify the site or establishment desired to be inspected (including, if possible, the owner and/or operator of the site). If all of the factual background for seeking the warrant is stated in the affidavit, the application should so state, and the application can be a one or two page document. The application should be signed by the U.S. Attorney or by his Assistant U.S. Attorney.

The affidavit(s) in support of the warrant application is a crucial document. It should consist of consecutively numbered paragraphs, and describe all the facts that support warrant issuance. It should recite or incorporate the neutral administrative scheme under which dropped line the basis for inspecting the particular establishment. Each affidavit should be signed by a person with personal knowledge of all the facts stated. In denial of entry cases, this person would most likely be the inspector who was denied entry. Note that an affidavit is a sworn statement that must either be notarized or personally sworn to before the magistrate.

The draft warrant should be submitted in a form whereby the magistrate will only have to sign it to make it a valid warrant ready for execution. The warrant is a direction to an appropriate official, i.e., an EPA inspector, U.S. Marshall or other Federal officer, to enter a specifically described location and perform specifically described inspection functions. The inspection is limited by the terms of the warrant so it is important to specify to the broadest extent possible the areas that are intended to be inspected, any records to be inspected, any samples to be taken, any articles to be seized, etc. While a broad warrant may be permissible in civil administrative inspections, a vague or overly broad warrant will probably not be signed by the magistrate, and may prove susceptible to constitutional challenge via a motion to quash and suppress evidence in Federal District court. The draft warrant will be signed by the magistrate, at which point it is an enforceable document. In drafting the warrant, there should be added, either following the magistrates signature, or on a separate page, a "Return of service" or "certificate of service" indicating upon whom the warrant was personally served, which should be signed and dated by the inspector. As they are developed, more specific warrant-issuance documents will be drafted and submitted to the Regions.

There are three basic types of warrants for inspection:

1. Civil specific probable cause warrant.

Where there is some specific probable cause for issuance of a warrant, such as an employee complaint or competitor's tip, the inspector should be prepared to describe to the U.S. Attorney in some detail the basis for this probable cause.

This will be stated in the affidavit in support of the warrant. This type of warrant should be used when the suspected violation is one that would result in a civil penalty or other civil action.

2. Civil probable cause based on a neutral administrative inspection scheme.

Where there is no specific reason to think that a violation has been committed, a warrant may still be issued if the Agency can show that the establishment is being inspected pursuant to a neutral administrative scheme. As the Supreme Court stated in Barlow's:

"Probable cause in the criminal law sense is not required. For purposes of an administrative search, such as this, probable cause justifying the issuance of a warrant may be based not only on specific evidence of an existing violation, but also on a showing that "reasonable legislative or administrative standards for conducting an . . . inspection are satisfied with respect to a particular [establishment]". A warrant showing that a specific business has been chosen for an OSHA search on the basis of a general administrative plan for the enforcement of the act derived from neutral sources such as, for example, dispersion of employees in various type of industries across a given area, and the desired frequency of searches in any of the lesser divisions of the area, would protect an employers Fourth Amendment rights."

Every program enforced by the Agency has such a scheme by which it prioritizes and schedules its inspections. For example, a scheme under which every permit holder in a given program is inspected on an annual basis is a satisfactory neutral administrative scheme. Also, a scheme in which one out of every three known PCB transformer repair shops is inspected on an annual basis is a satisfactory neutral administrative scheme for inspection, as long as neutral criteria, such as random selection, are used to select the individual establishment to be inspected. Headquarters will prepare and transmit to the Regions the particular neutral administrative scheme under which each program's inspections are conducted. Inspections not based on specific probable cause must be based on neutral administrative schemes for a warrant to be issued. Examples of two neutral administrative schemes are ~~provided~~ in the appendix.

The Assistant U.S. Attorney will request the inspector prepare and sign an affidavit that states the facts as he knows them, including the sequence of events culminating in the refusal to enter, and a recitation of either the specific probable cause or the neutral administrative scheme which led to the particular establishment's selection for inspection. The Assistant U.S. Attorney will then present a request for an inspection warrant, a suggested warrant, and the inspector's affidavit to a magistrate<sup>2</sup> or Federal district court judge.

### 3. Criminal Warrants.

Where the purpose of the inspection is to gather evidence for a criminal prosecution, the inspector and the Regional Attorney should request that the U.S. Attorney seek a criminal warrant under Rule 41 of the Federal Rules of Criminal Procedure. This requires a specific showing of probable cause to believe that evidence of a crime will be discovered. Agency policy on the seeking of criminal warrants has not been affected by Barlow's. The

2

The Barlow's decision states that imposing the warrant requirement on OSHA would not invalidate warrantless search provisions in other regulatory statutes since many such statutes already "envision resort to Federal court enforcement when entry is refused". There is thus some question as to whether the existence of a non-warrant Federal court enforcement mechanism in a statute requires the use of that mechanism rather than warrant issuance. We believe that the Barlow's decision gives the agency the choice of whether to proceed through warrant issuance or through an application for an injunction, since the decision is largely based on the fact that a warrant procedure imposes virtually no burden on the inspecting agency. In addition, an agency could attempt to secure a warrant prior to inspection on an ex parte basis, something not available under normal injunction proceedings. Several of the acts enforced by EPA have provisions allowing the Administrator to seek injunctive relief to assure compliance with the various parts of a particular statute. There may be instances where it would be more appropriate to seek injunctive relief to gain entry to a facility than to attempt to secure a warrant for inspection, although at this point we cannot think of any. However, since the warrant process will be far more expeditious than the seeking of an injunction, any decision to seek such an injunction for inspection purposes should be cleared through appropriate Headquarters staff.

distinction between administrative inspections and criminal warrant situations is discussed in Section II.A.2.

#### E. Inspecting with a Warrant

When the warrant has been issued by the magistrate or judge, the inspector may then proceed to the establishment to commence or continue the inspection. Where necessary because of a high probability that entry will be refused even with a warrant or where there are threats of violence, the inspector should be accompanied by a U.S. Marshall when he goes to serve the warrant on the recalcitrant owner. The inspector should never himself attempt to make any forceful entry of the establishment. If the owner refuses entry to an inspector holding a warrant but not accompanied by a U.S. Marshall, then the inspector should leave the establishment and inform the assistant U.S. Attorney and the designated Regional Attorney. They will take the appropriate action such as the seeking of a citation for contempt. Where the inspector is accompanied by a U.S. Marshall, the Marshall is principally charged with executing the warrant. Thus, if a refusal or threat to refuse occurs, abide by the U.S. Marshall's decision, whether it is to leave, to seek forcible entry, or otherwise.

The inspector should conduct the inspection strictly in accordance with the warrant. If sampling is authorized, the inspector must be sure to carefully follow all procedures, including the presentation of receipts for all samples taken. If records or other property are authorized to be taken, the inspector must receipt the property taken and maintain an inventory of anything taken from the premises. This inventory will be examined by the magistrate to assure that the warrant's authority has not been exceeded.

### Returning the Warrant.

After the inspection has been completed, the warrant must be returned to the magistrate. Whoever executes the warrant, (i.e., whoever performs the inspection), must sign the return of service form, indicating to whom the warrant was served and the date of service. He should then return the executed warrant to the U.S. Attorney who will formally return it to the issuing magistrate or judge. If anything has been physically taken from the premises, such as records or samples, an inventory of such items must be submitted to the court, and the inspector must be present to certify that the inventory is accurate and complete.

### III. Conclusion

Except for requiring the Agency to formalize its neutral inspection schemes, and for generally ending the Agency's authority for initiating civil and/or criminal actions for refusal to allow warrantless inspections, Barlow's should not interfere with EPA enforcement inspections.

Where there is doubt as to how to proceed in any entry case, do not hesitate to call the respective Headquarters program contact for assistance.

## APPENDIX

The Appendix contains three attachments.

Attachment I is a warrant application, affidavit and warrant to conduct an inspection, where the Agency has specific probable cause to believe that a civil violation of an EPA regulation or Act has occurred. In particular, care should be taken in spelling out the specific facts that give rise to probable cause. Note also, that the scope of the warrant is carefully articulated.

Attachment II is a warrant application, affidavit and warrant to conduct an inspection in which the establishment to be inspected has been selected under a neutral administrative inspection scheme. Note the extraordinary detail of the administrative scheme described in paragraphs 8-20 of the affidavit. Such detail should not be necessary for most EPA neutral administrative inspection schemes. Note also the executed inventory and return of service forms attached to Attachment II.

Attachment III contains a very brief scheme for PCB inspections. In implementing such a scheme, the Regions must still utilize neutral criteria in selecting the individual establishment to be inspected.



UNITED STATES DISTRICT COURT  
MIDDLE DISTRICT OF LOUISIANA

IN THE MATTER OF	:	
CLEAN LAND AIR AND WATER,	:	NO. 78-437
CORPORATION, D/B/A CLAW;	:	
ROLLINS ENVIRONMENTAL SERVICES:	:	APPLICATION FOR WARRANT TO
OF LOUISIANA INCORPORATED;	:	ENTER, INSPECT, PHOTOGRAPH,
ENVIRONMENTAL PURIFICATION	:	SAMPLE, COLLECT INFORMATION,
ADVANCEMENT INCORPORATED;	:	INSPECT AND COPY RECORDS
EPA, INC.; IN IBERVILLE	:	
PARISH, LOUISIANA	:	

TO THE UNITED STATES MAGISTRATE, by the United States of America, Environmental Protection Agency, through James Stanley Lemelle, Assistant United States Attorney, for the Middle District of Louisiana, hereby applies for a warrant pursuant to section 308 of the Federal Water Pollution Control Act, 33 U.S.C. 1318, and the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6927, for the purpose of conducting an inspection as follows:

To enter to, upon, or through the premises of a waste disposal operation known by various names including the CLAW facility, which consists of three sites, to wit: an injection well site, a field office and storage tanks, and waste pits and landfill site located in Iberville Parish, Louisiana in or near the Bayou Sorrells community. The facility can be reached for disposal purposes by truck or barge. The ownership and operation of the CLAW facility waste disposal operation has been known by several different names, to wit: Clean Land Air Water Corporation (CLAW); EPA, Incorporated; Environmental Purification Advancement; Environmental Purification Abatement (EPA, Inc.) and Rollins Environmental Services of Louisiana. A company letterhead using the names of CLAW and EPA, Inc. lists an address of Route 2, Box 380B, Plaquemine, Louisiana 70764. It is reported in the newspapers and elsewhere, that on July 28, 1978 - three days after the death of the truck driver on the CLAW facility - that the injection well on the CLAW facility was sold to the Rollins Environmental Services of Louisiana. Unsubstantiated reports say that CLAW no longer has any

assets, leaving the pits and landfills under the ownership of EPA, Inc. and the injection well under the ownership of Rollins. CLAW and EPA, Inc. are reported to be different company and/or corporate names for the same people. Despite these possible ownership changes, the CLAW facility apparently continues to be operated as a single unit. Further, it is reported that CLAW or Rollins is under a federal court order to honor its contract with a client to accept waste. For purposes of this application, affidavit and warrant, the three sites and all operations will be referred to as CLAW.

The field office and storage tanks are in or on the edge of Bayou Sorrells; the injection well site is about 1.6 miles northwest of Bayou Sorrells on the road; the waste open pits-landfills are located approximately 7.7 miles northwest of Bayou Sorrells on the levee road. The address of the CLAW facility is Clean Land Air Water Corporation EPA Incorporated, Route 2, Box 380 B, Plaquemine, Louisiana. These CLAW facilities are known to EPA inspectors and well known to local people.

The CLAW facility is an establishment subject to the requirements and prohibitions of the Federal Water Pollution Control Act, including but not limited to sections 301, 308 and 311, and sections 3007 and 7003 of the Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.)

On Friday, August 4, 1978, Edward McHam, an employee of the U.S. Environment Protection Agency, requested permission to enter and inspect the said premises. Despite such request, employees of said facility refused to grant access to said premises to Mr. McHam, a duly authorized inspector of the Environmental Protection Agency.

The determination to inspect said premises was based on the following:

The sheriff's office of Iberville Parish requested EPA's assistance and reported a death at said premises.

Local unrest and fear of the facility was reported to the Enforcement Division of Region VI, Dallas, Texas on Tuesday, August 1, 1978 and EPA was requested to inspect the facility which is a disposal site for chemical wastes and numerous oil wastes of a hazardous and toxic nature.

Much local unrest, and agitation and complaints have been reported on television and in newspapers concerning the operation of the CLAW facility as well as the untimely death of a 19 year old truck driver at said facility while he was discharging waste into an open pit at the facility. The death was possibly caused by his inhalation of toxic fumes caused by a reaction of mixing incompatible toxic wastes in the open pit. Allegedly two eye witnesses to the death of the driver reported the presence of choking fumes in the area when they opened the doors to their truck to assist the driver who died. They also reported that his truck was parked at the edge of the open pit truck ramp, with doors open at the time of his death. Subsequent laboratory tests of waste taken from the pits have shown waste materials present in the pit, which, when mixed with the spent caustic being discharged from the driver's truck could have caused the death. Final autopsy reports are still pending. It is reported and alleged that CLAW facility officials directed the driver to take and discharge his wastes at the truck ramp in the open pit, rather than in the injection well. Discharging toxic waste into an open pit, at the edge of a pit, is not a safe, desirable, or acceptable practice since toxic chemical reactions are very probable and can result in the death of anyone nearby.

Edward McHam made a preliminary inspection in which he obtained two pit samples and observed evidence of oil, hazardous wastes, waste spillage and a "sloppy" operation which appears to be dangerous to the environment

as well as hazardous to the health and welfare of citizens. He further observed high water markings on the adjacent trees at the pit site and a lack of levees between the sites and the Grand River and other waterways. In addition, there may be hazardous wastes and conditions which may pose a substantial present, or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

The inspection will be commenced in daytime within regular business hours and will begin as soon as practicable after issuance of this warrant and will be completed with reasonable promptness.

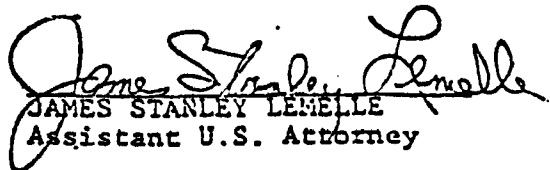
The inspection will be conducted by the United States Environmental Protection Agency (EPA) inspectors, who will be accompanied by the United States Marshal to ensure entry so that the EPA inspectors may perform an inspection of the premises, inspect and copy records, take photographs, gather information and evidence and collect samples in accord with 33 USC 1318 and 42 USC 6927.

A return will be made to the Court upon completion of the inspection.

WHEREFORE, it is respectfully requested that a warrant to enter and inspect the CLAW facility be issued.

Respectfully submitted,

DONALD L. BECKNER  
UNITED STATES ATTORNEY

  
JAMES STANLEY LEMELLE  
Assistant U.S. Attorney

AFFIDAVIT

STATE OF LOUISIANA

PARISH OF EAST BATON ROUGE

I, Edward McHam, being duly sworn, hereby depose and say:

1. I am a duly authorized employee of the United States Environmental Protection Agency, and my title is Chemical Engineer, Surveillance and Analysis Division, Region VI, which includes the State of Louisiana. In my capacity, I am responsible for inspecting facilities subject to various federal environmental statutes as directed by my supervisors.

2. On Tuesday, August 1, 1978 from about 7:45 p.m. to 8:45 p.m., I made a preliminary inspection of the CLAW facility and took two samples at the open pits. On Wednesday, August 2, 1978, I took a few photographs of the facilities from around 3:30 p.m. until 5:30 p.m. On Thursday, August 3, 1978 accompanied by another EPA employee, I visited the facility and area from about 11:30 a.m. to 2:00 p.m. and also took a few additional photographs. These brief visits to the site have only involved facility employees a few minutes each time in order to obtain passes from the field office and to open gates at various guard houses.

3. On Friday, August 4, 1978, a local deputy sheriff, state and local officials and I were refused admittance to the CLAW facility. Also, CLAW officials were no longer at the field house or available elsewhere to issue passes to enter. My previous sampling and inspection was not sufficient for laboratory purposes and needs to be resumed.

4. Information I have gathered in the local community, in newspapers, on television, from laboratory

tests of the samples, from the Iberville Sheriff's Office, and at the CLAW facility strongly suggest and support the need to enter and inspect the facilities for possible Section 301, 311 and other violations of the Federal Water Pollution Control Act. Further, it is possible that there are hazardous wastes and conditions on the premises as defined in Section 1004(5) of the Resource Conservation and Recovery Act of 1976, (42 USC 6903)(5) which constitute an imminent hazard under section 7003 of the Resource Conservation and Recovery Act of 1976 (42 USC 6973). These observations are:

a. Obvious spillage of waste material on the grounds of the CLAW facility subject to entering waterways.

b. Contaminated landfills with obviously exposed and damaged barrels with their contents emptied or nearly empty.

c. Drainage from landfills into a "fishing" lake and other adjacent areas leading to various waterways.

d. Open pits containing oil wastes and hazardous, toxic chemical wastes with the appearance of overflow wastes on the adjacent grounds as well as high water marks on trees next to the open pits equal to or higher than the pits.

e. The lack of levees between the facility grounds and drainage areas to the Grand River, "fishing lake", bayous and barrow ditches.

f. Copies of a few facility log records and other documents which were previously copied by the local Sheriff's office. These records indicate the receipt and content of oil and hazardous chemical wastes accepted at the facility.

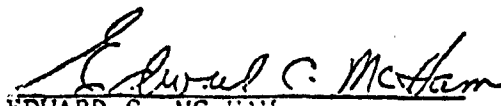
g. Poor maintenance and sloppy "housekeeping" practices at the facility which leads a reasonable person to recognize the likelihood of these prohibited pollutants

entering into nearby waterways including waters of the United States and its tributaries, as well as posing a threat to the environment and the public health and welfare of the United States.

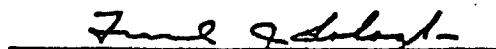
h. The reported death of a 19 year old truck driver at the CLAW (EPA, Inc.) open pits on July 25, 1978 while he was discharging waste into an open pit at the facility. The death was possibly caused by his inhalation of toxic fumes caused by a reaction of mixing incompatible toxic wastes in the open pit. Two eye witnesses to the death of the driver reported the presence of choking fumes in the area when they opened the doors to their truck to assist the driver who died. They also reported that his truck was parked at the edge of the open pit with the doors open at the time of death. Subsequent laboratory tests of waste taken from the pits have shown waste materials were present in the pit, which, when mixed with the spent caustic being discharged from the driver's truck could have caused the death. Final autopsy reports are still pending. It is allegedly reported that CLAW facility officials directed the driver to take and discharge his wastes to the truck ramp on the edge of an open pit. Discharging toxic waste into an open pit at the edge of a pit is not a safe, desirable, or acceptable practice since toxic chemical reactions are very probable and can result in the death of anyone nearby.

5. Section 308 of the Federal Water Pollution Control Act, 33 USC 1318, and section 3007 of the Resource Conservation and Recovery Act of 1976, (42 USC 6927), providing for entry, inspection, record inspection and copying and sampling are reasonable, in the public interest and necessary in order to carry out the provisions of these Acts, which Acts are designed to protect the environment, as

well as the public health and welfare. In the instant matter it is reasonable to assume the need for inspection based on the information and observations set out in paragraph 4 above and in the public interest.

  
EDWARD C. MC HAM  
CHEMICAL ENGINEER  
UNITED STATES ENVIRONMENTAL  
PROTECTION AGENCY

Subscribed and sworn to before me  
at Baton Rouge, State of Louisiana,  
this 10 of August, 1978.

  
U.S. Magistrate



UNITED STATES DISTRICT COURT  
MIDDLE DISTRICT OF LOUISIANA

IN THE MATTER OF  
CLEAN LAND AIR AND WATER,  
CORPORATION, d/b/a CLAW;  
ETC., ET AL.

NO. 78-134

WARRANT OF ENTRY, INSPECTION  
AND MONITORING PURSUANT TO  
33 U.S.C. §1318 and 42 U.S.C. §6927

TO: THE UNITED STATES OF AMERICA, UNITED STATES ENVIRONMENTAL  
PROTECTION AGENCY, THROUGH ITS DULY DESIGNATED REPRESENTATIVE  
OR REPRESENTATIVES, THE UNITED STATES MARSHAL OR ANY OTHER  
FEDERAL OFFICER

An application having been made by the United States of America, United States Environmental Protection Agency, for a warrant of entry, inspection and monitoring pursuant to 33 U.S.C. §1318 and 42 U.S.C. §6927, as part of an inspection program designed to assure compliance with the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act), 33 U.S.C. §1251, et seq., and the Resource and Recovery Act of 1976 (42 U.S.C. §6901, et seq.), and an affidavit having been made before me by Edward McHam, a duly authorized employee of the United States Environmental Protection Agency, that he has reason to believe that on the premises hereinafter described there exist a danger to the public's health, welfare and safety and to the property, rivers and environment of the United States, and that in order to determine whether the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act), 33 U.S.C. §1251, et seq., and the Resource and Recovery Act of 1976 (42 U.S.C. §6901, et seq.), and the rules, regulations and orders issued pursuant to the Acts have been or are being violated, an entry on, and inspection and monitoring of the said described property is required and necessary;

And, the Court being satisfied that there has been a sufficient showing that reasonable legislative or administrative standards for conducting an inspection and investigation have been satisfied with respect to the said described property and that probable cause exist to issue a warrant for the entry, inspection, investigation and monitoring of the said described premises:

IT IS HEREBY ORDERED AND COMMANDED that the United States of America, United States Environmental Protection Agency, through its duly designated representative or representatives, the United States Marshal, or any other federal officer are hereby entitled to and shall be authorized and permitted to have entry upon the following described property which is located in the Middle District of Louisiana:

"Those premises known as the Claw Corporation waste disposal facility in Iberville Parish, Louisiana, also known as EPA, Inc., Clear Land Air Water Corporation, Environmental Purification Advancement, Environmental Purification Abatement and possibly as the Rollins Environmental Services of Louisiana, or which are owned or operated by any other person or company, corporation or partnership, which premises and property are more particularly and further described as follows:

"From the intersection of La. Highway 75 and La. Highway 3066, proceed South for approximately 7 miles; turn right and travel across the Bayor-Sorrel-Pontoon Bridge, a distance of approximately 0.2 miles; turn right, proceed northwest on Route 2, the Lower Levee Road, for approximately 1.6 miles at which point the pavement ends; at this point turn right, travel approximately 0.1 miles to the entrance of the injection well, which is believed to be owned by Rollins Environmental Services of Louisiana, Incorporated, all as is shown on the attached photos identified as Government Exhibits 1 and 2.

"From the Rollins Environmental Services of Louisiana, Incorporated office, proceed South on the shell/gravel road for approximately 1.4 miles until the road deadends. This is the location of the field office of Clean Land Air and Water (CLAW), and storage tanks which are believed to be owned by Rollins Environmental Services of Louisiana Incorporated, all as is shown on the attached photos identified as Government Exhibits 3, 4, and 5.

"From the field office of CLAW, return to the site of the intersection at the paved lower levee road and the road leading to the deep well injection site (Rollins Environmental). Proceed northwest on the unpaved shell/gravel lower levee road approximately 6.1 miles to the entrance road and bridge leading to the gate guard house and gate of the EPA, Inc. waste disposal pits. This same entrance road is 7.7 miles northwest along the lower levee road from the intersection of the lower levee road and Bayou Sorrel Pontoon Bridge Road.

IT IS FURTHER ORDERED that the entry, inspection, investigation and monitoring authorized herein shall be conducted during regular working hours or at other reasonable times, within reasonable limits and in a reasonable manner from 6:00 a.m. to 10:00 p.m.

IT IS FURTHER ORDERED that the warrant issued herein shall be for the purpose of conducting an entry, inspection, investigation and monitoring pursuant to 33 U.S.C. §1318 and 42 U.S.C. §6927 consisting of the following:

- (1) entry to, upon or through the above described premises, including all buildings, structures, equipment, machines, devices, materials and sites to inspect, sample, photograph, monitor or investigate the said premises;
- (2) access to, seizure of and copying of all records pertaining to or related to the operation of the facility, equipment, waste materials which are accepted and stored on the premises and records which are required to be maintained under 33 U.S.C. §1318(a) (A), and 42 U.S.C. §6901, et seq., including any rules and regulations and orders promulgated thereto;
- (3) inspection, including photographing, of any monitoring equipment or methods required by 33 U.S.C. §1318(a) (A), and 42 U.S.C. §6927;
- (4) inspection, including photographing, of any equipment, processes or methods used in sampling, monitoring or in waste characterization;
- (5) inspection, including photographing, of any equipment or methods used to dispose of or store waste substances;
- (6) sample and seize any pollutants, effluents, runoff, soil, or other materials or substances which may reasonably be expected to pollute the waters of the United States under various conditions or threaten the public health, safety or welfare of the people of the United States;

- (7) seize, inspect, sample, and photograph any evidence which constitutes or relates to or is part of a violation of the Federal Water Pollution Control Act (commonly referred to as the Clean Water Act, 33 U.S.C. §1251, et seq., and the Resource and Recovery Act of 1976 (42 U.S.C. §6901, et seq.);
- (8) take such photographs of the above authorized procedures as may be required or necessary.

IT IS FURTHER ORDERED that a copy of this warrant shall be left at the premises at the time of the inspection.

IT IS FURTHER ORDERED that if any property is seized, the officer conducting the search and seizure shall leave a receipt for the property taken and prepare a written inventory of the property seized and return this warrant with the written inventory before me within 10 days from the date of this warrant.

IT IS FURTHER ORDERED that the warrant authorized herein shall be valid for a period of 10 days from the date of this warrant.

IT IS FURTHER ORDERED that the United States Marshal is hereby authorized and directed to assist the representatives of the United States Environmental Protection Agency in such manner as may be reasonably necessary and required to execute this warrant and the provisions contained herein, including but not limited to gaining entry upon the premises, the inspection and monitoring thereof, the seizure and sampling of materials, documents or equipment, and the photographing of the premises, and the materials or equipment thereon.

DATED this 10 day of August, 1978.

Frank J. [Signature]  
UNITED STATES MAGISTRATE

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

IN THE MATTER OF:

GENERAL MOTORS CORPORATION  
GENERAL MOTORS ASSEMBLY DIVISION  
WILLOW RUN AIRPORT  
YPSILANTI, MICHIGAN 48197  
AND  
VEHICLE EMISSION LABORATORY  
GENERAL MOTORS PROVING GROUND  
MILFORD, MICHIGAN 48042

)  
)  
)  
)  
) APPLICATION FOR  
) ADMINISTRATIVE WARRANTS  
)  
)  
)  
)  
)

NOW COMES the Administrator for the Environmental Protection Agency (EPA), by and through the United States Attorney, and applies for administrative warrants to enter, to observe a Selective Enforcement Audit (SEA) test on a configuration of motor vehicles manufactured by the General Motors Corporation (GM) as specified in a SEA test order issued on July 28, 1978, by the Assistant Administrator for Enforcement of EPA, and to inspect GM's records, files, papers, processes, controls, and facilities which are involved in and associated with the manufacture and testing of said configuration pursuant to said test order at the premises of the GM Willow Run vehicle assembly plant, Ypsilanti,, Michigan, and the GM vehicle emission laboratory at Milford, Michigan, in accordance with Sections 206(b) and (c), 208(a) and 301(a) of the Clean Air Act, 42 U.S.C. §7525(b) and (c), 7542(a) and 7601(a), and regulations promulgated thereunder. In support of this application, the Administrator respectfully submits an affidavit and proposed warrants.

James K. Robinson  
United States Attorney

By: \_\_\_\_\_

Assistant United States Attorney

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

IN THE MATTER OF:

GENERAL MOTORS CORPORATION	)	ADMINISTRATIVE WARRANT FOR
GENERAL MOTORS ASSEMBLY DIVISION	)	ENTRY AND INSPECTION UNDER
WILLOW RUN AIRPORT	)	THE CLEAN AIR ACT
YPSILANTI, MICHIGAN 48197	)	
	)	

TO: MATTHEW A. LOW, Acting Chief, Manufacturers Programs  
Branch, Mobile Source Enforcement Division, Office of  
Enforcement, United States Environmental Protection Agency  
(EPA), and any other duly designated enforcement officers or  
employees of the EPA:

Application having been made, and Matthew Low having shown  
probable cause for the issuance of an administrative warrant  
for entry; observation of a Selective Enforcement Audit  
(SEA) test on the configuration of motor vehicles manufactured  
by General Motors Corporation (GM) of engine family 840B2  
and engine code 2, with 4000-pound inertia weight, A-3  
transmission and 2.56 rear axle ratio, as specified in a SEA  
test order issued on July 28, 1978, by the Assistant Administrator  
for Enforcement of EPA; and inspection of GM's records,  
files, papers, processes, controls and facilities which are  
involved in and associated with the manufacture and testing  
of said configuration pursuant to said test order at the  
premises of the GM Willow Run vehicle assembly plant, Ypsilanti,  
Michigan;

WHEREFORE, pursuant to the Clean Air Act as amended, 42 U.S.C.  
§7401 et seq., and the regulations thereunder, you and any duly  
designated enforcement officers and employees of the Environmental  
Protection Agency are hereby authorized to enter the above-described  
premises at reasonable times during normal operating hours for the

purpose of conducting an administrative inspection pursuant to Sections 206(b) and (c), 208(a) and 301(a) of the Clean Air Act, 42 U.S.C. §§7525(b) and (c), 7542(a) and 7601, and 40 C.F.R. §86.601 et seq. You and any duly designated enforcement officers and employees of EPA are authorized to observe activities conducted by GM pursuant to the SEA test order issued on July 28, 1978, concerning the vehicle configuration specified in said test order to determine whether GM is complying with 40 C.F.R. part 86 and with the test order. The activities that you and the designated persons are authorized to observe include the following: vehicle and engine manufacture, assembly, and storage procedures; sample test vehicle selection procedures; and related activities. You and any designated enforcement officers and employees are authorized to inspect at reasonable times during normal operating hours the records, files, papers, processes, controls and facilities which are involved in and associated with the above activities and are maintained, used and generated by GM at that location. You and any duly designated enforcement officers and employees are authorized to copy documents and photograph components, test vehicles and facilities.

The duration of this inspection shall be of such reasonable length as to enable you and the authorized enforcement officers and employees of EPA satisfactorily to complete such inspection according to 40 C.F.R. §86.601 et seq.

A prompt return of this warrant shall be made to  
this court showing that the warrant has been executed and that  
inspection has been completed within such reasonable time.

DATED: July 31, 1978  
*5:00 P.M.*

*B. J. R. K. H. H.*  
UNITED STATES MAGISTRATE

*This warrant to be executed within 48 hours.*



RETURN OF SERVICE

I hereby certify that a copy of the within warrant was served by presenting a copy of same to Robert Prevost an agent of General Motors Corporation (GM) on August 1, 1978, at the GM Willow Run vehicle assembly plant, Ypsilanti, Michigan

  
(Name of person making service)

Robert C. [unclear]  
(Official Title within the United States Environmental Protection Agency)

RETURN

Inspection of the establishment described in this warrant was completed on August 4, 1978.

  
Name of EPA employee

Inventory of Property Received Pursuant to Administrative  
Warranty

GM Assembly Division, Willow Run Airport, Ypsilanti,  
Michigan 48197

1. Vehicle Inspection Record Form (Chassis No. 2 (yellow)  
#WRM-71-64)
2. Xeroxed copies of lists of VIN Numbers of Cars making up  
Batches 4, 5, 6, 7, 8, 9 (7 sheets)

These are the items that EPA has received under  
the authority granted it pursuant to the Administrative  
Warrant for Entry and Inspection

Bruce Lundy  
Enforcement Officer  
11:30 am 8/4/78

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

IN THE MATTER OF :	)	AFFIDAVIT IN SUPPORT OF
	)	APPLICATION FOR WARRANTS
GENERAL MOTOR CORPORATION	)	TO ENTER AND INSPECT
GENERAL MOTORS ASSEMBLY DIVISION	)	PURSUANT TO THE CLEAN AIR
WILLOW RUN, AIRPORT	)	ACT (42 U.S.C. §7401 <u>et seq.</u> )
YPSILANTI, MICHIGAN 48197	)	
AND	)	
VEHICLE EMISSION LABORATORY	)	
GENERAL MOTORS PROVING GROUND	)	
MILFORD, MICHIGAN 48042	)	

Matthew Low being duly sworn upon his oath, according to law, deposes and says:

1. I am Acting Chief, Manufacturers Programs Branch, Mobile Source Enforcement Division, Office of Enforcement, United States Environmental Protection Agency (EPA), Washington, D.C. I am in charge of a program known as the Selective Enforcement Audit (SEA) program, which will be described below. I report to the Director of the Mobile Source Enforcement Division, who is under the Deputy Assistant Administrator for Mobile Source and Noise Enforcement; in turn, he is under the Assistant Administrator for Enforcement, who reports to the Administrator of the Environmental Protection Agency.

2. This affidavit is made in support of an application for administrative warrants to enter; observe a Selective Enforcement Audit (SEA) test on the configuration of motor vehicles manufactured by the General Motors Corporation (GM) of engine family 840B2 and engine code 2, with 4000-pound inertia weight, A-3 transmission and 2.56 rear axle ratio as specified in a SEA test order issued on July 28, 1978, by the Assistant Administrator for Enforcement of EPA; and inspect GM's records, files, papers, processes, controls, and facilities which are involved in and associated with

the manufacture and testing of said configuration pursuant to said test order at the premises of the GM Willow Run vehicle assembly plant at Ypsilanti, Michigan, and the GM vehicle emission laboratory at Milford, Michigan, pursuant to Sections 206(b) and (c), 208(a) and 301(a) of the Clean Air Act, 42 U.S.C. §7525(b) and (c), 7542(a), and 7601(a), and 40 C.F.R. §86.601 et seq., 41 Fed. Reg. 31472 (July 28, 1976).

3. Title II of the Clean Air Act, 42 U.S.C. §§7401, 7520-7551, establishes the Federal program for control of motor vehicle emissions. Emission standards for motor vehicles are prescribed pursuant to Section 202 of the Act, 42 U.S.C. §7521. Section 206(a), 42 U.S.C. §7525(a), authorizes the EPA Administrator to require new motor vehicles to be tested to determine whether such vehicles conform with the emission standards and other regulations prescribed pursuant to Section 202. Such standards are applicable for the vehicles' useful life (5 years or 50,000 miles). The vehicles that are tested during this certification process are usually pre-production prototypes. In the certification process the manufacturer submits applications for certification, each covering one or more engine families and setting forth the corresponding technical descriptions, specifications, and operating parameters for each family covered. An engine family is made up of a group of vehicle models, known as "configurations", with the same basic engine and emission control system specifications. One or more prototypes, known as durability vehicles, from each engine family are subjected to testing over 50,000 miles to determine deterioration in emissions performance for that engine family. Thereafter, prototypes, known as emission-data vehicles, of individual configurations within a given family

are subjected to a 4000-mile test. The emission levels of the emission-data vehicles during their useful life are determined by applying the "deterioration factor" calculated from the 50,000-mile test results for that engine family to the emission data obtained after 4000 miles of operation. If it is demonstrated that the prototype vehicles of the various configurations within an engine family comply with the emission standards over their useful life and with other regulations, the Administrator issues to the manufacturer a certificate of conformity for the particular engine family described in the application.

4. To determine whether new motor vehicles actually being manufactured, as distinguished from pre-production prototypes, meet the regulations, including emission levels, with respect to which the certificate of conformity was issued, Section 206(b), 42 U.S.C. §7525(b), authorizes the Administrator to test and to require the testing of new production vehicles. In addition, to enforce Section 206, Section 206(c) provides that officers or employees designated by the Administrator may enter a manufacturer's plant to conduct tests of vehicles and to inspect records, files, papers, processes, controls, and facilities. Section 208(a), 42 U.S.C. §7542(a), further requires manufacturers to establish and maintain such records, make such reports, and provide such information as the Administrator may reasonably require to enable him to determine whether the manufacturer has acted or is acting in compliance with Title II of the Act and the regulations promulgated thereunder and to permit duly-designated EPA officers or employees to have access to and copy such records. Section 301(a), 42 U.S.C. §7601(a), authorizes the Administrator to prescribe such regulations as are necessary to carry out his functions under the Act and to delegate to any EPA officer or

employee such of his powers and duties under the Act, except the making of regulations, as he may deem necessary or expedient. Based upon the authority of Section 206, 208 and 301, 42 U.S.C. §§7525, 7542 and 7601, EPA has established a program for spot assembly-line testing known as the Selective Enforcement Audit (SEA) program. Regulations concerning the SEA program are set forth at 40 C.F.R. §86.601 et seq., 41 Fed. Reg. 31472 (July 28, 1976).

5. Under the SEA program, the manufacturer can be required to test a representative sample of production vehicles from a designated motor vehicle configuration to determine whether the configuration is being manufactured to conform to the applicable emission requirements. The SEA regulations prescribe specific procedures by which SEA testing is to be conducted, including procedures for vehicle selection, preparation and pre-conditioning, for dynamometer operation to simulate driving conditions and for collection of vehicle exhaust gas samples for analysis. A SEA is initiated by the issuance of a test order to a manufacturer requiring that manufacturer to conduct emissions testing and specifying, among other items, the motor vehicle configuration to be tested, the plant or storage facility from which vehicles must be selected and the procedures to be employed in selecting sample vehicles for SEA testing. Section 206(b) of the Act, 42 U.S.C. §7525(b), authorizes the Administrator to issue a test order. Pursuant to Section 301(a) of the Clean Air Act, 42 U.S.C. §7601(a), the Administrator has delegated the authority to conduct testing through the issuance of test orders to EPA's Assistant Administrator for Enforcement along with the further authority to redelegate this power to the Deputy Assistant Administrator for Mobile Source and Noise Enforcement, and in

turn to redelegate to the Director, Mobile Source Enforcement Division. EPA Delegation 7-30, November 10, 1977. Such re-delegation to the Deputy Assistant Administrator was made on November 14, 1977.

6. Under Sections 206(b) and (c), 208(a) and 301(a) of the Clean Air Act, 42 U.S.C. §§7525(b) and (c), 7542(a) and 7601(a), and 40 C.F.R. §86.601 et seq., duly designated EPA enforcement officers and employees are authorized under the SEA program to enter the manufacturers' facilities at reasonable times during normal working hours for the purpose of observing activity relating to the SEA testing and inspecting records, files, papers, processes, controls and facilities to determine if the manufacturer is acting in compliance with regulations and the test order. Ordinarily, the EPA monitoring includes observation of vehicle and engine manufacture, assembly and storage procedures; sample test vehicle selection procedures; sample test vehicle preparation, pre-conditioning, mileage accumulation, emission testing, maintenance and soaking procedures, as well as the calibration of test equipment; and related activities. Commonly, EPA inspects records, files, papers, processes, controls, and facilities which are involved in and associated with the above activities and are maintained, used or generated by the manufacturer at the locations where test vehicle assembly, SEA test vehicle selection and testing take place. Also, EPA is authorized to copy documents, photograph components, test vehicles and facilities and obtain reasonable assistance from facility personnel in executing its functions under the SEA program. EPA attempts to enter and conduct these inspection-related activities in conjunction with each SEA test order for the purpose of monitoring the activity of the manufacturer undertaken pursuant to the test order to ensure

projected sales volume is used as the basis for establishing the preliminary number of SEA test orders to which that manufacturer may be subject annually. A higher production volume requires more audits for sufficient review of the manufacturer's production. The maximum number of SEA test orders that may issue to a given manufacturer during a given model year is preliminarily set at the number obtained by dividing that manufacturer's total projected sales for that model year by 300,000 and rounding to the nearest whole number. 40 C.F.R. §86.603(f). Any manufacturer with projected sales of less than 150,000 may be subject to an initial annual limit of one SEA test order. One additional SEA test order may issue to a manufacturer for each configuration failing an audit and, when the annual limit figure, increased by these additional test orders, has been met, for each configuration for which evidence exists indicating noncompliance. Because the agency's resources are limited, EPA may undertake fewer SEA's than are authorized by its regulations.

10. Within these annual limits on the number of test orders EPA may issue to each manufacturer, EPA employs a systematic process, as discussed below, for choosing which configuration of which manufacturer to subject to an audit. Initially, EPA seeks to issue test orders proportionately among manufacturers according to their respective annual projected sales and to distribute those test orders evenly over the course of a model year. This process then employs three primary sources of information, assembly-line test data, projected sales volume, and certification data, as bases for assigning points to rank configurations for the purpose of determining which configuration would be most appropriate for an audit at a given time. Once



that such activity conforms to the requirements of the test order and the SEA regulations.

7. The manufacturer is notified by the test order of the configuration (or alternate) to be tested, the location from which test vehicles will be selected, when the testing is to begin and when EPA officers and employees will be present. The date of completion of the test, and therefore the duration of the EPA inspection, is not specified at the outset because it is not possible to do so. SEA selection and testing normally take up to two weeks. If the manufacturer elects to retest vehicles in an attempt to avoid failing an audit, or if upon failing an audit a re-audit is necessary, audit activity under the test order may continue for a month. The Clean Air Act Selective Enforcement Audit regulations, 40 C.F.R. §86.601 et seq., 41 Fed. Reg. 31472 (July 28, 1976), and the test order define the scope and purpose of the audit. The test order identifies the EPA enforcement officers and employees who have been designated to enter, observe activities, and inspect records, files, papers, processes, controls and facilities used in or associated with the audit.

8. Under the regulations and the Clean Air Act, a SEA test order may be issued to any manufacturer at any time for any motor vehicle configuration being manufactured. When a SEA test order provides less than 24 hours notice to the manufacturer, the SEA test order must be authorized in writing by the EPA Assistant Administrator for Enforcement.

9. The frequency with which SEA test orders are issued to any given manufacturer is generally based on that manufacturer's proportionate share of total vehicle production. A manufacturer's

configurations are ranked, the process also considers other, non-quantifiable factors in reaching an ultimate decision about which configuration to audit.

11. Where data being evaluated by EPA from any of these three sources pertains to individual configurations, points are assigned to the respective individual configurations according to the guidelines of the ranking system. If the data evaluated pertains to engine families, points based on a engine family's data will be assigned for ranking purposes to an individual configuration within the engine family. The configuration receiving the engine family's points will be identified according to two factors. To begin with, its production rate must be high enough to enable sample test vehicles to be selected for testing in an expeditious manner. Once that determination has been made, its actual physical characteristics (such as engine code, inertia weight, type of transmission, or rear-axle ratio) which distinguish it from other configurations within the engine family must make it the configuration most likely to produce the highest level of emissions of the configurations in that family.

12. Before ranking configurations, SEA's systematic configuration selection process applies the general objective that each manufacturer should receive at least one half of its annual limit of audits as computed from its projected sales during the model year, with those audits distributed over the model year, to ensure proper review of the total production of each manufacturer. Thus under the plan described below, a configuration of a particular manufacturer may replace another configuration of any manufacturer which otherwise would have been chosen for an audit. This result occurs whenever issuing the test order to the manufacturer

of the replaced configuration would have subjected that manufacturer to a disproportionate number of audits as of that time in the model year.

13. The most important factor considered quantitatively by EPA is a configuration's emissions data which have been generated by a manufacturer's own quarterly assembly-line testing and submitted to EPA. The data allows EPA to evaluate both the rate at which production vehicles coming off the assembly line fail to meet an emission standard for a given pollutant and the mean emission value measured from assembly-line vehicles as compared to a pollutant's emission standard. Points due to failure rates are assigned to a vehicle configuration as follows:

<u>Failure Rate</u> <u>Range</u>	<u>Points</u>
0-10%	0
11-20%	5
21-30%	15
31-40%	30
40% and above	50

Points according to the configuration's mean emission value compared to the emission standard (std) are assigned as follows:

<u>Range</u>	<u>Points</u>
Mean value is between 0.9 of the std and the std	5
Mean value is greater than the std but less than or equal to 1.1 of the std	15
Mean value is greater than 1.1 of the std	30

Application of the point total derived from these calculations will take into account the reliability that can be attributed to the data submitted by a manufacturer. For example, EPA will assess the number of vehicles tested in order to determine the failure rate or mean emission value. Data

reliability also depends upon the extent to which a discrepancy is found in a comparison between past SEA data pertaining to the configuration in question and the manufacturer's most recently submitted internal assembly-line data. Furthermore, evaluation of this point total also will consider both whether a manufacturer has failed to provide test data for one or more configurations in production at the time the assembly-line data was generated and whether any "running changes" incorporated into the manufacturer of a configuration since that time may be expected to cause the emissions level of the configuration to exceed standards for a pollutant.

14. The next most important factor in this point ranking system is the configuration's (or engine family's) projected annual sales figure as provided by the manufacturer in its application for certification. Points based upon projected sales are assigned as follows:

<u>Annual Projected Sales</u>	<u>Points</u>
0-20,000	0
20,000-50,000	10
50,000-100,000	20
100,000 and above	30

This factor focuses on higher-production models and tends to assure through SEA review that a high percentage of vehicles produced complies with the emission standards.

15. Finally, certification data generated from prototype testing and regarding configurations currently in production are examined; that is, EPA reviews the pertinent certification data on configurations being manufactured either according to the manufacturer's original application for certification or according to its latest running change application for an amended certificate of conformity. If the configuration's emission performance level based on that data is within 10% of the emission

standard for a given pollutant, 15 points are assigned to that configuration. Application of this factor may be adjusted where analysis by EPA's certification group indicates that certification test data may not be indicative of whether production vehicles of that configuration are likely to meet emission requirements. The focus of this factor is on vehicles that have demonstrated only marginal compliance during the certification or running change approval process.

16. Aside from these quantitative factors and the objective of distributing audits among manufacturers throughout the model year, in choosing which configuration of which manufacturer to audit EPA takes into account the location of the manufacturer's assembly plant and test facilities. This factor generally is given significant consideration if these establishments are located overseas or are otherwise geographically removed from the Midwestern United States. Most manufacturing and testing establishments are located in the area, and therefore most audit activity can be expected to take place there. EPA also considers whether a configuration is being manufactured at a sufficiently high rate to allow sample vehicles to be selected expeditiously for testing. Information on current production rates of configurations might not be requested from a manufacturer so as to avoid suggesting to manufacturers which configurations may be subject to an imminent test order. Thus, a test order can designate an alternate configuration of that manufacturer for testing, chosen according to the normal systematic process described above subject to the constraints regarding location and production rate, in the event that the primary configuration is unavailable for testing.

17. Automobile manufacturers for the most part have centralized their testing facilities in eastern Michigan. Consequently, they generally have expressed a preference that vehicle selection for any audit of any configuration produced in that area and others take place at a plant in that area. Pursuant to 40 C.F.R. §86.603(d), EPA complies with these indicated preferences when specifying locations for vehicle selection pursuant to a test order unless the Administrator determines that information exists indicating noncompliance at other plants. If a manufacturer does not indicate a preferred plant for a configuration being audited, the test order will specify that test vehicle selection be conducted at the location closest to the manufacturer's testing facility at which a sufficient number of vehicles are available from which a sample representative of the configuration can be chosen expeditiously, unless it is determined that evidence exists indicating non-compliance at another plant. Since the goals of the EPA program can be accomplished with a relatively high percentage of audits testing vehicles selected from locations in eastern Michigan, a relatively high percentage of vehicle selection for SEA's takes place in that area. Once a test order has been issued covering a specific manufacturer, configuration and facility for sample test vehicle selection, EPA sends a team of enforcement officers to the manufacturer's facilities where selection and testing take place for the purpose of monitoring the manufacturer's activity performed in response to the test order.

18. Experience with the administration of the SEA program has produced indications that providing a manufacturer with advance

notice of an intent to require SEA testing before EPA enforcement officers can gain access to the manufacturer's facilities pursuant to that test order can give the manufacturer an opportunity to alter its production processes. The manufacturer thereby can bias production of a vehicle configuration so that sample vehicles selected for SEA testing will not provide representative data which would enable EPA to review accurately the manufacturer's production of that configuration on the whole. Such notice would occur if EPA enforcement officers requested permission to enter a facility to monitor activity related to the SEA, and permission to enter were refused, before a warrant authorizing that entry were obtained.

19. On the basis of 1978 model year projected sales alone General Motors may be subject to 20 test orders during the model year and has been subject to 10 orders thus far. Ford may receive 11 test orders on the basis of projected sales and has been issued 8. Chrysler may receive 5 test orders based on projected sales and has received 6, since one of its configurations failed an audit. See 40 C.F.R. §86.603(f). American Motors may be issued 1 test order based on projected sales and has not yet received any. Four European and three Japanese auto manufacturers have been audited during the current model year.

20. GM is a manufacturer of automobiles and operates facilities devoted to that purpose at its Willow Run vehicle assembly plant in Ypsilanti, Michigan. GM also operates emission testing facilities at its vehicle emissions testing laboratory in Milford, Michigan, where GM usually ships cars for SEA testing after such cars have been selected at a vehicle assembly plant as SEA sample test vehicles. GM produces hundreds of different configurations during the model year.

21. GM is still eligible to receive 10 SEA test orders for model year 1978 configurations. The configuration specified in the SEA test order issued on July 28, 1978, has been chosen as the subject for SEA testing because of the configurations currently under production and available for selection it has accumulated the greatest number of points under EPA's systematic process for choosing configurations to audit and because no non-quantitative factors indicate that another configuration is more appropriate for auditing. Assembly-line test data submitted by GM which, according to our analysis, pertains to its engine code 2 configuration of its 840B2 engine family with 4000-pound inertia weight, A-3 transmission and 2.56 rear axle ratio shows a 56% failure rate of vehicles tested with respect to the emission standard for nitrous oxides (NOx), giving that configuration 50 points for ranking purposes. The mean emission value for NOx derived from this assembly-line testing (1.99 grams/mile) falls within 0.9 of the NOx emission standard (2.00 grams/mile), contributing another 5 points. The projected annual sales for this configuration is 63,741, giving the configuration an additional 20 points. Certification testing conducted for this configuration produced data which showed the prototype CO emissions level (15 gram/mile) to be within 10% of the CO emission standard (also 15.0 grams/mile), thereby assigning the configuration 15 more points. The configuration's point total of 90 is the highest for any configuration remaining in production long enough and at a rate high enough to allow for expeditious sample test vehicle selection pursuant to the SEA regulations.



22. The document, which is attached and incorporated by reference, and sets forth the SEA test order for this configuration will be delivered to GM by an EPA enforcement officer at the same time the designated officers and employees appear at GM's vehicle assembly facilities in Ypsilanti, Michigan, to begin monitoring GM's activities performed pursuant to the SEA test order. The entry, observation and inspection there and at GM's vehicle emission testing laboratory in Milford, Michigan will be consistent in purpose, scope, location and timing with the Clean Air Act, this Court's administrative warrants, EPA regulations, the test order and the program described in this affidavit.

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MATTHEW LOW

Sworn and subscribed before me  
this \_\_\_\_\_ day of \_\_\_\_\_, 1978

RECOMMENDED INSPECTION SCHEME

1. 3 Electric Utilities
2. 4 PCB article and equipment repair facilities
3. 2 PCB processors or PCB article Manufactures  
(i.e. Transformer and capacitor Manufacturers)
4. 1 Die casting facility or Hydraulic system operator
5. 1 Waste Oil handling facility

In the event that there are no known facilities in the Region for an above category eliminate that item or use category 3 or 4 as alternatives.

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#### Section C. Gathering Evidence

- C-1. Chain-of-Custody Procedure for Source Sampling, Section C-1-3  
3.0.3 of Quality Assurance Handbook for Air Pollution  
Measurement Systems, Vol. III - Stationary Source  
Specific Methods, EPA-600/4-77-027b, August 1977.

C-1

CHAIN-OF-CUSTODY PROCEDURE FOR  
SOURCE SAMPLING

Section 3.0.3. of Quality Assurance Handbook  
for Air Pollution Measurement Systems, Vol. III -  
Stationary Source Specific Methods  
EPA-600/4-77-027b  
August 1977

U.S. Environmental Protection Agency  
Office of Research and Development  
Environmental Monitoring and Support Laboratory  
Research Triangle Park, North Carolina 27711

C-1-3

## CHAIN-OF-CUSTODY PROCEDURE FOR SOURCE SAMPLING

As part of the overall quality assurance activities associated with the collection and analysis of source samples, particular attention should be directed to the handling of the sample and the analysis report.

Source test results, or possibly even the sample itself, may be used to prove the compliance status of a facility. However, test results and samples will not be admitted as evidence unless it can be shown that they accurately represent the conditions that prevailed at the time the test was conducted. This requires that:

1. the sample be collected properly,
2. the sample be handled properly,
3. the sample be analyzed in accordance with documented test procedure, and
4. the analysis (test report) be prepared completely and accurately and then filed in a secure place.

Failure to comply with these requirements may void the results of a test or, at least, diminish the credibility of the test report.

### 1.0 Sample Collection

Proper sampling requires the use of the correct method, the equipment designated by the method, and competent personnel. Prior to the test date, the tester should determine that the proposed test methods comply with the appropriate testing regulations; in some instances, it may be necessary to deviate from the proposed methods. For example, the only reasonable sample site may be too close to an elbow or a duct obstruction. In such cases, the tester should make an engineering analysis of the use of the test site and then proceed only after obtaining the approval of the administrator. This determination should be recorded in the field notes. An after-the-fact site analysis may suffice in many instances, but good quality assurance techniques dictate that this analysis be made prior to spending the many man-hours required to extract the sample. Once the test method is selected, preparations for the test should be made according to documented guidelines.

### 1.1 Preparations

When conducting the test, it is necessary that the sample be extracted in a manner to ensure that it represents the actual conditions at the time of the test. This means that the process is operating in its mode specified by the

applicable control regulation, the extracted sample typifies the stack gas conditions, and the instruments used in the sampling are properly calibrated and maintained.

Because the results of source tests are being used increasingly as proof of compliance, the pretest preparation and posttest scrutiny are becoming more sophisticated. Thus, steps need to be taken prior to the actual test to ensure the integrity of the test data.

In many cases, reagents or filters are prepared prior to sampling and become an integral part of the sample itself. A record should list the date, the person by whom it was prepared, and the location of these items at all times from preparation until actual use for sampling. Since these items become a part of the sample itself, it is necessary that their integrity be maintained from preparation through analysis. For example, a bulk quantity of solution may be prepared and transported to the field where the specified amount is used in accordance with the test method. The bulk solution ultimately becomes an integral part of several samples during the sampling process. For this reason, one member of the sampling crew generally serves as sample custodian and should be responsible for entering information on sample preparation items in the field notebook. However, as long as proper records are kept more than one individual may serve in this capacity. This serves as a written record for the sampling crew and also fulfills chain-of-custody procedures.

## 1.2 Sample Handling

Once the sample is procured it should be handled in such a way as to ensure that there is no contamination and that the sample analyzed is actually the sample taken under the conditions reported. For example, each sample should be kept in a secure place between the time it is extracted and the time it is analyzed. If further analysis may be required, the sample should be returned to a secure place. It is always best to keep a sample secure up to the time it is discarded. These security measures should be documented by a written record signed by the handlers of the sample.

Identification - Care should be taken to mark the samples to ensure positive identification throughout the test and analysis procedures. The Rules of Evidence used in legal proceedings require positive procedures for identification of samples used in analyses as the basis for future evidence. An admission that the laboratory analyst could not be positive whether sample No. 6 or sample No. 9 was analyzed could destroy the validity of the entire test report.

Positive identification also should be provided for the

filters used in any specific test before taring. If ink is used for marking, it must be indelible and unaffected by the gases and temperatures to which it will be subjected. Other methods of identification can be used, if they provide a positive means of identification and do not impair the function of the filter.

Finally, each container should have a unique identification to preclude the possibility of interchange. Grease pencils may be used for this purpose. A better method, however, is to affix an adhesive-backed label to the container. The number of the container should be recorded on the analysis data form. Figure 1 shows how a standardized identification sticker can be used for each of the four containers needed to collect a sample for EPA Test Method 5.

Contamination and Tampering - To reduce the possibility of invalidating the results, all components of the sample should be carefully removed from the sampling train and placed in nonreactive containers. The best method of sealing depends on the container. Place containers in a place of limited access (i.e., locked van or locked sample box). This will preclude accidental opening of the container and should be a sufficient safeguard if all other aspects of the chain-of-custody procedure are observed. However, if there is any possibility of temporary access to the samples by unauthorized personnel, the sample jars and containers should be sealed with a self-adhesive sticker that has been signed and numbered by the test supervisor or other responsible person. This sticker should adhere firmly to ensure that it cannot be removed without destruction. The samples should then be delivered to the laboratory for analysis. It is recommended that this be done on the same day that the sample is taken. If this is impractical, all of the samples should be placed in a carrying case or other place of limited access (preferably locked) for protection from breakage, contamination, and loss.

In transporting the sample to the laboratory, it is important that precautions be taken to eliminate the possibility of tampering, accidental destruction, and physical and/or chemical damage to the sample. This practical consideration should be dealt with on a case-by-case basis. For example, samples obtained from a rock crusher are non-reactive but those from an asphalt saturator may be reactive, and gaseous samples may decay or react.

The person who has custody of the samples should be able to testify that no one tampered with them. Any handling of samples by unauthorized persons can result in contamination. For example, a curious person with a cigarette in his mouth may open a sample; the smallest ash dropping

Container No. <u>A-4</u>		Remarks
Plant <u>ABC Corp.</u>	City <u>Podunk</u>	
Site <u>Exit Kiln stack</u>	Pollutant <u>Part.</u>	
Date <u>11-18-77</u>	Run No. <u>2</u>	
<input checked="" type="checkbox"/> Front half	Front filter no. _____	
Back half	Back filter no. _____	
Rinse <u>Acetone</u>		
Volume: Initial <u>N.A.</u> Final <u>300 ml.</u>		
Cleanup by: <u>J. Doe</u> Field Chief: <u>N. Graves</u>		

## PROBE RINSINGS

Container No. <u>A-5</u>		Remarks
Plant <u>ABC Corp.</u>	City <u>Podunk</u>	
Site <u>Exit Kiln Stack</u>	Pollutant <u>Part.</u>	
Date <u>11-18-77</u>	Run No. <u>2</u>	
Front half	Front filter no. _____	
<input checked="" type="checkbox"/> Back half	Back filter no. _____	
Rinse <u>Acetone Blank</u>		
Volume: Initial <u>N.A.</u> Final <u>N.A.</u>		
Cleanup by: <u>J. Doe</u> Field Chief: <u>N. Graves</u>		

## ACETONE BLANK

Container No. <u>F-6</u>		Remarks
Plant <u>ABC Corp.</u>	City <u>Podunk</u>	
Site <u>ESP Outlet</u>	Pollutant <u>Part.</u>	
Date <u>11-18-77</u>	Run No. <u>2</u>	
Front half	<input checked="" type="checkbox"/> Front filter no. <u>14757</u>	
Back half	Back filter no. _____	
Rinse <u>N.A.</u>		
Volume: Initial <u>N.A.</u> Final <u>N.A.</u>		
Cleanup by: <u>J. Doe</u> Field Chief: <u>N. Graves</u>		

## FILTER

Container No. <u>S-7</u>		Remarks <u>132 GM Tare</u>
Plant <u>ABC Corp.</u>	City <u>Podunk</u>	
Site <u>ESP Outlet</u>	Pollutant <u>Part.</u>	
Date <u>11-18-77</u>	Run No. <u>2</u>	
Front half	Front filter no. _____	
Back half	Back filter no. _____	
Rinse <u>Silica gel</u>		
Volume: Initial <u>N.A.</u> Final <u>N.A.</u>		
Cleanup by: <u>J. Doe</u> Field Chief: <u>N. Graves</u>		

## SILICA GEL

FIGURE 1. Typical labels used for samples collected for a source test of particulate matter using EPA Test Method 5.



into the container could make a significant difference in the analysis. Security should be continuous. If the samples are put in a truck, lock it. In the laboratory, the samples should be kept in a secure place.

To ensure that none of the sample is lost in transport, mark all liquid levels on the side of the container with a grease pencil. Thus any major losses that occur will be readily ascertainable.

Chain-of-Custody - The chain-of-custody is perhaps the most critical part of the test procedure. The chain-of-custody is necessary to make a prima facie showing of the representativeness of the sample. Without it, one cannot be sure that the sample analyzed was the same as the one purported to be taken at a particular time. The samples should be handled only by persons associated in some way with the test. A general rule to follow is "the fewer hands the better", even though a sealed sample may pass through a number of hands without affecting its integrity. Ideally, all sample containers should be transported from the site to the vehicle and from the vehicle to the laboratory by the same person.

It is generally impractical for the analyst to perform the field test. For this reason, each person should remember from whom the sample was received and to whom it was delivered. This requirement is best satisfied by having each recipient sign the data form for the sample or set of samples. Figure 2 shows a form for particulate samples which may be used to establish the chain of custody from the test site to the laboratory. This form is designed for tests performed by EPA Method 5. Note that the silica gel was weighed in the field. If for some reason this is not done, the silica gel must be returned with the other containers, and an appropriate notation made under "Remarks". Figure 3 shows another form which may be used. A form of this type should accompany the samples at all times from the field to the laboratory. All persons who handle the samples should sign the form. It is important to realize that the chain-of-custody procedures do not stop with the sample analysis. If the sample must be kept for future analysis, it should be kept in a secure storage area. Figures 2 and 3 reflect this.

## 2.0 Sample Analysis

For source samples to provide useful information, laboratory analyses should meet the following requirements:

1. Equipment should be adequate for proper analysis;
2. Personnel should be qualified to make analysis;
3. Analytical procedures should be in accordance with accepted good practice; and
4. Records should be complete and accurate.

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ABC Corp. Podunk Ohio Sample date: 11-17-77  
 Sample location: Kiln exit stack Run no.: 2  
 Sample recovery by: John Doe Recovery date: 11-18-77  
 Filter(s) no.: 14757

MOISTURE

Impingers	Silica gel
Final volume (wt) <u>380</u> ml(gm)	Final wt. <u>268</u> g <u>-</u> g
Initial volume (wt) <u>300</u> ml(gm)	Initial wt. <u>250</u> g <u>-</u> g
Net volume (wt) <u>80</u> ml(gm)	Net wt. <u>18</u> g <u>-</u> g
Total moisture <u>98</u> g	
Color of silica gel <u>pink and blue</u>	
Description of impinger water <u>cloudy</u>	

RECOVERED SAMPLE

Filter container no. F-6 sealed ✓  
 Description of particulate on filter gray

Acetone rinse container no. <u>A-4</u>	Liquid level marked <u>✓</u>
Acetone blank container no. <u>A-5</u>	Liquid level marked <u>✓</u>

Samples stored and locked N/A  
 Remarks: transported directly to lab.

Date of laboratory custody 11-18-77  
 Laboratory personnel taking custody Jim Smith  
 Remarks: \_\_\_\_\_

FIGURE 2. Chain-of-custody receipt form for source sample.

Plant ABC Corp, Padunk, D.

Sample number	Number of container	Description of Samples
2	A-4	Acetone Rinse
	A-5	Acetone Blank
	F-6	Filter # 14757

Person responsible for samples <u>J. Doe</u>				Time <u>4:30 p.m.</u>	Date <u>11-18-77</u>
Sample number	Relinquished by:	Received by:	Time	Date	Reason for change of custody:
2	<u>J. Doe</u>	<u>J. Smith</u>	<u>5:00 p.m.</u>	<u>11-18-77</u>	<u>put in sample locker</u>
Sample number	Relinquished by:	Received by:	Time	Date	Reason for change of custody:
	<u>J. Smith</u>	<u>W. Frank</u>	<u>10:15 a.m.</u>	<u>11-20-77</u>	<u>Run analysis</u>
Sample number	Relinquished by:	Received by:	Time	Date	Reason for change of custody:
	<u>W. Frank</u>	<u>J. Smith</u>	<u>4:30 p.m.</u>	<u>11-20-77</u>	<u>put in sample locker</u>
Sample number	Relinquished by:	Received by:	Time	Date	Reason for change of custody:
Sample number	Relinquished by:	Received by:	Time	Date	Reason for change of custody:

FIGURE 3. Chain-of-custody receipt form - general form.

The first three requirements are discussed elsewhere in this handbook and need no further elaboration.

Complete and accurate records generally take the form of a laboratory notebook. Where practical, standard pre-printed forms should be used. Do not discard these records, since it is possible that they will be needed in the future to substantiate the final report. Figures 4 and 5 are examples of standardized forms that can be used in the laboratory. Note that the entries on these forms must agree with those shown on the container labels (Figure 1) and on the chain-of-custody receipt form (Figures 2 and 3).

### 3.0 Field Notes

Manual recording of data is required for source tests. Standardized forms should be utilized to ensure that all necessary data are obtained. These forms should be designed to clearly identify the process tested, the date and time, the test station location, the sampling personnel, and the person who recorded the data. During the actual test period, the meter readings, temperature readings, and other pertinent data should be recorded in the spaces immediately upon observation. These data determine the accuracy of the test and should not be erased or altered. Any error should be crossed out with a single line; corrected value should be recorded above the crossed-out number.

Do not discard the original field records even if they become soiled. For neatness, the field data may be transcribed or copied for inclusion in the final report, but the originals should be kept on file. Copies are not normally admissible as evidence, but since the records may be subpoenaed, it is important that all field notes be legible.

### 4.0 The Report as Evidence

In addition to samples and field records, the report of the analysis itself may serve as material evidence. Just as the procedures and data leading up to the final report are subject to the Rules of Evidence, so is the report itself. Written documents, generally speaking, are considered hearsay and are not admissible as evidence without a proper foundation. A proper foundation consists of testimonies from all persons having anything to do with the major portions of the test and analysis. Thus the chief of the field team, the cleanup man, all persons having custody of the samples, and the laboratory analyst would be required to lay the foundation for introduction of the test report as evidence. However, the foundation laying is greatly simplified under statutory exceptions to the Hearsay Rule (found in the Uniform Business Records as Evidence Act) and the Federal Rules of Evidence.<sup>1,2</sup>

Federal Rules 803(6) and 803(24) recognize that a record of events is the result of input from many persons

## ANALYTICAL PARTICULATE DATA

Plant ABC Corp., Padunk, Ohio Run No. 2Sample location Kiln exit stackDensity of acetone (pa) 0.790 g/ml

Sample type	Container No.	Liquid Level Marked	Container Sealed
Acetone blank	<u>A-5</u>	<u>✓</u>	<u>✓</u>
Acetone rinse	<u>A-4</u>	<u>✓</u>	<u>✓</u>
Filter(s)	<u>F-6</u>		<u>✓</u>

Acetone rinse volume (Vaw) 300 mlAcetone blank residue concentration (Ca)  $2.1 \times 10^{-3}$  mg/gWa = Ca Vaw pa =  $(2.1 \times 10^{-3}) (300) (.790) =$  0.5 mgDate and time of wt 11-20-77; 9:00 a.m. Gross wt. 5210.8 mgDate and time of wt 11-21-77; 8:25 a.m. Gross wt. 5210.6 mgAverage gross wt. 5210.7 mgTare wt. 5108.6 mgLess acetone blank wt. (Wa) 0.5 mgWeight of particulate in acetone rinse 101.6 mgFilters(s) no. 14757Date and time of wt 11-20-77; 9:10 a.m. Gross wt. 652.8 mgDate and time of wt 11-21-77; 8:15 a.m. Gross wt. 652.6 mgAverage gross wt. 652.7 mgTare wt. 450.0 mgWeight of particulate on filter(s) 202.7 mgWeight of particulate in acetone rinse 101.6 mgTotal weight of particulate 304.3 mg

Remarks: \_\_\_\_\_

Signature of analyst W. FrankSignature of reviewer Jeri Smith

FIGURE 4. Standard form for Laboratory analysis of sample (EPA Test Method 5).

## ANALYTICAL BLANK DATA

Plant ABC Corp., Padunk, Ohio Blank no. A-5  
Sample location Kiln exit stack  
Liquid level at mark ✓ container sealed ✓  
Density of acetone ( $\rho_a$ ) 0.790 mg/ml  
Acetone blank volume ( $V_a$ ) 300 ml  
Date and time of wt. 11-20-77; 9:15 a.m. Gross wt. 5080.8 mg  
Date and time of wt. 11-20-77; 3:20 p.m. Gross wt. 5080.6 mg  
Average gross wt. 5080.7 mg  
Tare wt. 5080.2 mg  
Weight of blank ( $m_a$ ) 0.5 mg

$$C_a = \frac{m_a}{V_a \rho_a} = \frac{(0.5)}{(300)(.790)} = 0.0021 \text{ mg/g}$$

Remarks: \_\_\_\_\_

Signature of analyst W. Shank

Signature of reviewer Gene Smith

FIGURE 5. Standard form for laboratory analysis of acetone blank.

who have no reason to lie and that introduction of all these persons as witnesses is onerous. These rules, which recognize the complexity and mobility of our society, are even more liberal than the Uniform Business Records as Evidence Act. Some 30 states have adopted this Act, and the trend is definitely toward excepting scientific reports from the Hearsay Rule. Indeed, in many cases the trial judge will require the parties to verify the authenticity of source test reports during the pretrial proceedings. However, the party against whom the report is offered still has the right, with reasonable cause, to cross-examine the test participants. In this area, the trial judge may exercise discretion.

The relaxed attitude toward reports of experiments made by persons in the regular course of activity greatly simplifies the introduction of the report as evidence. Only the custodian of the report (usually the supervisor or the test team) need testify.

To ensure exception from the Hearsay Rule, all test reports should be filed in a secure place by a custodian having this responsibility. Although the field notes and calculations are not generally included in the summary report, this material may be required at a future date to bolster the acceptability and credibility of the report as evidence in an enforcement proceeding. Therefore, the full report--including all original notes and calculation forms--should be kept in the file. Signed receipts for all samples should also be filed with the test data.

These records are also subject to the Best Evidence Rule, which basically states that the original of a document is the best evidence and that a mere copy is not admissible as evidence. Microfilm, snap-out carbon copies, and similar contemporary business methods of producing copies are acceptable in many jurisdictions if the unavailability of the original course is adequately explained and if the copy was made in the ordinary course of business.

In summary, although all the original calculations and test data need not be included in the final report, they should be kept in the agency's files. It is a good rule to file all reports together in a secure place. Keeping these documents under lock and key will ensure that the author can testify at future court hearings that the report has not been altered.

## 5.0 References

1. Uniform Laws Annotated, Vol. 9A Miscellaneous Acts. Uniform Business Records as Evidence Act, 1936 Act, Edward Thompson Co., Brooklyn, N.Y., 1965, p. 506.
2. Federal Rules of Evidence for U.S. Court and Magistrates, West Publishing Co., St. Paul, Minn., July 1, 1975.



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A PRIMER FOR EPA EMPLOYEES:  
PRESENTING SCIENTIFIC EVIDENCE

James A. Rogers  
Office of General Counsel  
September 1974

## **Preface**

**This primer is the result of a dialogue between the Assistant Administrator for Research and Development and the Assistant Administrator for Enforcement and General Counsel requesting closer interaction between the research and legal elements of EPA. The primer was developed to supplement a seminar program held at the various National Environmental Research Centers during the fall of 1974.**

## 1. Introduction

This document is not intended to be used as a legal reference. The purpose of this primer is to give practical guidance to scientists as to what to expect when they become involved in some form of litigation in which they are asked to present the results of their research or investigation. The discussion is directed primarily at water pollution control because most of the adversary type proceedings in which a scientist may be called upon to testify will be related to water pollution and because most of the practical lessons have been in this field. To avoid making this presentation unduly long, many generalizations have been made and fine points of evidentiary rules, for example, have been ignored. The intent is to point out in a general way what one will be asked by the government attorney and on cross-examination so that laboratory or field investigation procedures may be tailored to avoid the tragedy of having valuable scientific work rendered less useful for failure to follow a protocol. The specific preparation of a particular witness for a particular hearing, of course, necessarily must take place with the government trial counsel in the time immediately before he is to testify and is shaped largely by the substance of his testimony.

I have placed a great deal of reliance on actual examples of testimony, both good and bad, in attempting to make points. The names of witnesses have been deleted; none of them is an EPA employee.

## 2. Types of Proceedings

### a. Trials in Court

The traditional way in which environmental issues are litigated is in a courtroom, either federal or state. There have been hundreds of cases in which the state or federal government brought actions against a polluter either for violation of specific statutory or regulatory requirements or for violation of some public nuisance concept. The Reserve Mining case is the supreme example of this: the federal government based its claim for relief on the pre-1972 Federal Water Pollution Control Act and the water quality standards promulgated thereunder; the plaintiff states sued largely on the basis of public nuisances ("unreasonable interference with the public's right to use and enjoy the environment").

There will be fewer court cases, involving water pollution at least, in which expert witnesses will be called upon to testify. Or at least the witnesses will be called upon to present less sophisticated proof than before.

This is because the country is gradually moving to the National Permit Discharge Elimination System (NPDES)<sup>1/</sup> under which most contested facts will be resolved in hearings before the Agency instead of in trial before a judge. Thus, whether the waste from a particular discharge will interfere with oyster reproduction, and therefore what maximum effluent discharge restrictions should be contained in the permit, is an issue which will be addressed in hearings before the Agency's Administrative Law Judges. If a discharger is violating its permit, the Justice Department -- or the State Attorney General if the NPDES program is being administered by the State -- will bring an action. Here the issue will be simply whether the effluent levels have exceeded the permit terms; it will be much like a license violation case: the factual issue will be whether the permit was violated -- basically a monitoring chore -- not whether deleterious effects occur by discharging at that level. (This change in the burden of proof was one of the major reasons for amending the Act to employ the permit system).

Of course, even with the NPDES program, there will be court actions and the basic rules of evidence for presentation of expert testimony will come into play. These rules will be examined below in the section dealing with adjudicatory administrative hearings.

b. Administrative Trial-Type Hearings

Increasingly EPA is holding administrative trial-type hearings. Mention has already been made of the NPDES procedures. There also will be a great need for expert testimony in FWPCA section 316(a) hearings in which power companies will attempt to demonstrate that the "effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made...." The first of these hearings will begin this fall.

The third section of the recently enacted water pollution legislation, which has already generated substantial litigation, is section 307(a), establishing effluent standards for toxic water pollutants.<sup>2/</sup> This section is unusual in that Congress has called for a legislative rule-making hearing to take on many of the trappings of a trial. Most importantly, the procedures for section 307(a) hearings call for cross-examination of witnesses.

The category of hearing which probably has thus far generated the greatest workload for EPA scientists is the pesticide cancellation hearings. These have been held for DDT and are being conducted for Aldrin/Dieldrin

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<sup>1/</sup>The basic statutory framework is set out in sec. 402 of the Federal Water Pollution Control Act, as amended.

<sup>2/</sup>The first list of toxic water pollutants consisted of Aldrin/Dieldrin, DDT, Benzidine, Cadmium, Mercury, Cyanide, PCB's, Endrin and Toxaphene.

and Mirex under the Federal Insecticide Fungicide and Rodenticide Act (FIFRA). Traditionally these battles last for months and are fought by the manufacturer and EPA, although the parties also include environmental groups, users, and smaller companies who package various formulations using their own labels.

The rules for presenting the expert testimony in trials and adjudicatory type administrative proceedings really differ little. In each situation the scientist is asked to testify as to his knowledge on technical questions relevant to the issues being tried. It may be helpful to remember that conclusions and opinions generally are not permissible forms of testimony and that an exception to this rule is made for expert testimony under the theory that laymen would be unable to draw conclusions in difficult technical areas without the assistance of experts. But is only when the expert testifying is truly expert in the field, is drawing upon his expertise in making a conclusion, and laymen (judge or jury), given the same facts, could not render a conclusion, that his opinion testimony is permitted.

Except on rare occasions the expert will not be asked to render an opinion on the ultimate question; for example, he will not be allowed to give his opinion that the permit for a power plant discharge should call for a mixing zone of 1500 feet. If he is a biologist he will, however, be allowed to say what the effect of use of a 1500' mixing zone on the zooplankton would be. The expert witness in his proper role is merely providing a part of the technical base upon which decisions are made. For him to render a judgment on questions in which other disciplines come into play is to enter fields in which he is not expert and in which he cannot render assistance to the trier of fact.

In the pesticide cancellation hearings, the Agency Administrative Law Judges have been allowing scientists to state their views as to whether a product should be banned, the ultimate question to be decided, but have also said that they will not give this testimony great weight. In a court trial, such testimony would not be allowed at all.

Perhaps the major difference between expert testimony in the court trial and in an adjudicatory administrative proceeding is the extent to which hearsay is allowed. Hearsay evidence is

...testimony in court, or written evidence of a statement made out of court, the statement being offered as an assertion to show the truth of matters asserted therein, and thus resting for its value on the credibility of the out-of-court asserter. 3/

3/McCormick on Evidence, 2nd Ed., 1972, p. 584.

It is important to remember that the hearsay rule applies to both oral and written statements by an out-of-court party. In a traditional suit, then, a witness testifying on the proper analytical methods for detecting methoxychlor, for example, could not refer to a paper by another scientist confirming the appropriateness of his methods if the purpose is to suggest that the substance of that paper is true. Nor could a witness testify that his results were confirmed by Dr. Jones, with whom he talked last week.

In administrative proceedings the hearsay rule is relaxed substantially. In the proceedings held to date before EPA administrative law judges, hearsay expert testimony has been allowed if there is a "nexus" between the witness's expertise and the subject of the paper -- authored by another -- to which he wishes to refer. The witness in the hearing room must, however, be prepared to stand some cross-examination on the document. Thus, if he cannot say whether the analytical methods used by the other investigator were acceptable, he may not be allowed to use the paper.

c. Administrative Legislative Hearing

Quick mention is made of those administrative proceedings in which "generic" rules are being considered. This may be in an EPA rule-making hearing or in federal or state legislative proceedings in which proposed statutes are being debated. There is usually only informational questioning not in an adversary setting. Often scientists appear in panels and most of the time the bulk of the testimony has been prepared in advance.

d. Presenting Direct Evidence

The direct testimony in a court trial is usually given orally, often with reference to a written report and always with access to written factual data upon which the expert is relying in rendering his conclusions. And almost always the direct testimony relates to the effects of the discharges from a specific plant or outfall.

In administrative proceedings quite often now the direct testimony is in written narrative form and only the cross-examination is done orally. There are many advantages to this: the witness and his lawyer can be sure that the important points are covered, and difficult concepts can be presented with more precision than is usually possible in oral testimony. The opposition is usually given a week or two to study the document before the witness appears. This allows them to narrow the areas of cross-examination and to prepare for the often intricate questioning of the scientific data. It allows the cross-examiner to have his own expert go over the material with a fine-toothed comb. The end result is a more organized hearing. It also allows the hearing to go forward without the necessity of elaborate "discovery," since the tender of written direct testimony well in advance of the hearing serves the basic purposes of pre-trial discovery: avoidance of surprise.

Unfortunately, one of the by-products of the use of written direct testimony which is entered into the record without reading, is a feeling by some witnesses that their testimony did not hold up well. This is because the experienced cross-examining attorney chooses to question the witness only on points on which he thinks the witness is not capable of giving firm, well documented answers. Thus witnesses have gone an entire day without being asked to discuss their basic research. Nevertheless, that research will be used if it is adequately presented in the written testimony.

More than any other problem encountered by EPA trial lawyers is the natural resistance on the part of scientists to write complete narratives rather than short precis of their work. There may be an assumption that whatever the rules at the hearing they will get to elaborate orally on the presentation. In several instances the opposition attorneys have not cross-examined at all because otherwise dangerous witnesses did not present a statement worthy of the underlying research or investigations. The rule to remember in writing direct testimony is to put on paper everything you want to say. It is far easier for your lawyer to cut you back if you said too much than it is for him to interpolate in a difficult scientific area. An example of a good written presentation is attached as Appendix A. Appendix B is an example of a statement that, while short, attempts to say too much (see the last paragraph). Note in the well written statement that reference is made to Appendix A, B, C, etc. Documentary evidence relevant to the witness's presentation is usually physically attached to the written testimony and referred to in the body of the presentation. Sometimes these attachments are referred to as exhibits rather than appendices.

It has often been said that the direct testimony of an expert witness consists of four parts: (a) his qualifications (by education and/or experience) as an expert, (b) the material from which he fashions his opinion, (c) the process or reasoning by which he gets from the material at hand to his conclusion or opinion, and (d) the conclusion or opinion itself. Usually there is little dispute over an expert's personal background and that information comes in without question. In many cases the presentation of raw data itself or with a clear statistical explanation is enough for one to draw a conclusion, and logical step-by-step delineation of how the experiment was conducted or how the field samples were analyzed is vital to show-case this data. Rather than belabor points (b)-(d) in abstract terms, actual examples will be presented in the later discussion of cross-examination to show what should and should not be done.

### 3. Discovery

Discovery is a general term used to describe the process by which one side in litigation finds out what the factual basis for the other side's case is. In federal or state court actions there are several procedures by which this can be accomplished. The most frequently used procedure is the taking of oral depositions. Under this procedure, the potential witness is placed under oath before a court reporter and asked a wide range of questions designed to prepare the opposing lawyer for his testimony at the trial.



The deposition is also an opportunity for the opposition to ask about reports, memos, maps, lab books, pictures, etc., which the "deponent" knows of or may have in his possession and which he does not intend to use in the trial, i. e., material which the other side may wish to use. By use of a subpoena duces tecum (very roughly "you are ordered to appear and bring all the following documents with you") the opposing party can force an EPA scientist to collect all material arguably applicable to the issue. The lawyer may precede the "noticing" of a deposition by filing a motion to inspect all the documents related to the question. This helps prepare him to take the deposition.

Another less often used procedure is the use of written questions served upon the opposition and to be answered under oath (interrogatories). Sometimes this is used to initiate discovery by asking "who are the scientists who have any knowledge on this subject" or "where are your freshwater laboratories located," or "who have you consulted in bringing this lawsuit"?

Scientists are virtually united in their horror of the all powerful discovery procedures, drafted and enacted by lawyers, which can force them to photoduplicate massive amounts of material. Some lawyers have argued that, unlike conspiring executives in an antitrust case, scientists should not be put through the ordeal of having filing cabinets raided. Actually, the Federal Rules of Civil Procedure, applicable in federal courts but adopted intact by most states, provide for restricted discovery of an expert's data. Rule 26(b)(1) states the basic rule:

Parties may obtain discovery regarding any matter, not privileged, which is relevant to the subject matter involved in the pending action, whether it relates to the claim or defense of the party seeking discovery or to the claim or defense of any other party, including the existence, description, nature, custody, condition and location of any books, documents, or other tangible things and the identity and location of persons having knowledge of any discoverable matter. It is not ground for objection that the information sought will be inadmissible at the trial if the information sought appears reasonably calculated to lead to the discovery of admissible evidence.

From this base, the Rules in section 26(b)(4) set forth an exception for experts:

Discovery of facts known and opinions held by experts, otherwise discoverable under the provisions of subdivision (b)(1) of

this rule and acquired or developed in anticipation of litigation or for trial, may be obtained only as follows:

(A)(i) A party may through interrogatories require any other party to identify each person whom the other party expects to call as an expert witness at trial, to state the subject matter on which the expert is expected to testify, and to state the substance of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion. (ii) Upon motion, the court may order further discovery by other means, subject to such restrictions as to scope and such provisions, pursuant to subdivision (b)(4)(C) of this rule, concerning fees and expenses as the court may deem appropriate. " (Emphasis supplied.)

What the Rules giveth (in the form of protection to scientists) the trial judges usually taketh away, in response to motions to have full discovery of expert witnesses and documents. The theory advanced by most of these judges is that in large complex cases, in order not to unduly drag out the trial, it is essential to have the parties do the exploratory questioning prior to trial. It must be remembered that most civil litigation in the United States is between two private parties and may involve one or two experts at the most; the EPA scientist is likely to appear, if at all, in a major suit or hearing in which the government and a large business are the parties and in which a dozen or more experts will testify. In such situations it is unlikely that discovery will be restricted.

Are any materials privileged and not subject to disclosure? Increasingly the answer is, virtually nothing. Memos between researchers in a laboratory, draft reports, memos of telephone calls, and letters have all been held to be discoverable. Only a very limited category of documents which fall in the category of attorney "work product" are privileged. What falls under this heading cannot be stated with precision but they are essentially those analyses of the law and/or facts produced by the attorney or at his direction in preparation specifically for this litigation. This author has seen very few works of a scientist which have fallen within this category. That your work is probably susceptible to discovery should not be a deterrent to candor: no one can be faulted for stating what he knows. But it should be a deterrent for hastily formed opinions or personal comments which may be misunderstood if taken out of context.

No rigid distinction can be drawn in the above discussion between trials in courts and administrative proceedings because increasingly lawyers have used the Freedom of Information Act (FOIA) to obtain those documents discoverable under court rules. The EPA regulations

on the FOIA reveal how this can be done. Once having complied with the mechanical requirements of 40 CFR Part 2, such as making a request in writing at the right office, a party is entitled to review and copy all materials except those

1. -- specifically exempted from disclosure by [some other] statute.
2. -- trade secrets and commercial or financial information obtained from a person and privileged or confidential.
3. -- interagency or intra-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with the agency.
4. -- geological and geophysical information and data, including maps, concerning wells.

Emphasis has been added to category 3 to show why lawyers can argue that the broad rules of the Federal Rules of Civil Procedure should be employed in FOIA interpretations. The complete list of exemptions are in 40 CFR §2.105(a). If there is doubt whether all or part of the requested material should be disclosed, the procedures set forth in 40 CFR §§2.104 - 2.107 should be followed.

#### 4. Procedures of Laboratory Research and Field Investigations Which Are Subject to Attack

##### a. Chain of Custody

The scientist or technician who fills water bottles in a stream just below a potential defendant's outfall must take precautions to insure that at trial the sample bottle he refers to can be shown to correspond to a sample taken at a certain time and a certain place. The often elaborately stated rules of chain of custody are nothing more than a means of guaranteeing the integrity of the identification of field samples. McCormick's Handbook of the Law of Evidence states simply that the expert witness must be able to trace the chain of custody "with sufficient completeness to render it improbable that the original item has either been exchanged with another or been contaminated or tampered with." This requirement must be met before the evidence can be received at all; it does not simply affect the weight to be given to the evidence.

The Legal Support Division of the Office of Enforcement and General Counsel in May of 1972 prepared a rather detailed guide for scientists gathering field samples. What follows is largely taken from that primer.

Stream and effluent samples should be obtained by using standard field sampling techniques. The chain of custody record tag should be attached to the sample container at the time the sample is collected and should contain the following information: sample number, date and time taken,

source of sample (include type of sample and name of firm), the preservative and analyses required, name of person taking sample and witnesses. An actual tag is shown in Appendix C, and a sample transmittal sheet is reproduced in Appendix D. The pre-filled side of the card should be signed, timed and dated by the person sampling. The sample container should then be sealed with a pre-printed, gummed seal containing the Agency's designation, date and sampler's signature. The seal should cover the string or wire tie of the chain of custody tag so that the tag cannot be removed and the container cannot be opened without breaking the seal. The tags and seals must be filled out legibly in ballpoint (waterproof ink).

Blank samples should be collected in containers with and without preservatives so that laboratory analyses can be performed to show that there was no container contamination. A bound field notebook, or log, should be used to record field measurements and other pertinent information necessary to refresh the sampler's memory in the event he later becomes a witness in an enforcement proceeding. A separate set of field notebooks should be maintained for each survey and stored in a safe place where they can be protected and accounted for at all times. A standard format should be established to minimize field entries and should include the date, time, survey, type of samples taken, volume of each sample, type of analysis, sample numbers, preservatives, sample location, field measurements such as temperature, conductivity, DO, pH, and any other pertinent information or observations. The entries should then be signed by the field sampler. The responsibility for preparing and retaining field notebooks during and after the survey should be assigned to a survey coordinator, or his designated representative.

The field sampler is responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He must assure that each container is in his physical possession or in his view at all times, or stored in a locked place where no one can tamper with it.

Color slides or photographs are sometimes taken of the outfall sample location and any visible water pollution in the vicinity. Written documentation on the back of the photo should include the signature of the photographer, time, date, and site location. Photographs of this nature, which may be used as evidence, should be handled according to the established chain of custody procedures.

When transferring the possession of samples, the transferee must sign and record the date and time on the chain of custody record tag. Custody transfers, if made to a sample custodian in the field, should be recorded for each individual sample. Every person who takes custody must fill in a standardized "Receipt of Sample" form (see Appendix C). To prevent undue proliferation of custody cards, the number of custodians in the chain of possession should be as few as possible.

Mailed packages should be registered with return receipt requested. If packages are sent by common carrier, a Government Bill of Lading should be obtained. Receipts from post offices, and bills of lading or other common carrier receipts should be sent to and retained by the laboratory custodians as part of the permanent chain of custody documentation.

The laboratory should designate an employee or employees as a sample custodian. In addition, the laboratory should designate a clean, dry, isolated room that can be securely locked from the outside as a "sample storage security area." The sample custodian must maintain a permanent log book in which he records, for each sample, the person delivering the sample, the person receiving the sample, date and time received, source of sample, sample number, how transmitted to lab, and a number assigned to each sample by the laboratory. A standardized format should be established for log book entries.

Samples should be handled by the minimum possible number of persons. Distribution of samples to laboratory personnel who are to perform analyses should be made only by the custodian. The custodian should enter into the log the laboratory sample number, time and data, and the signature of the person to whom the samples were given.

Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them and should be prepared to testify that the sample was in their possession and view or securely locked up at all times from the moment it was received from the custodian until the tests were run. Once the sample testing is completed, the unused portion of the sample, together with all identifying tags and seals, should be returned to the custodian who will make appropriate entries in his log. The returned tagged sample should be retained in the sample room until it is required for trial. Strip charts and other testing documentation also should be turned over to the custodian.

#### b. Laboratory Research Techniques

Volumes have been written on proper laboratory techniques, so there will be no attempt here to indicate in even a general way what procedures should be followed in examining a particular substance. The purpose of this section is more to emphasize the role proper (or arguably improper) sampling technique plays in a case. If a lawyer determines that an expert witness can do harm to his client's case, and that the substance of what the witness has to say is probably correct, or at least difficult to attack, then he will attempt to cast doubt upon the analytical methods employed by that scientist. It is imperative that accepted laboratory techniques be followed to the letter and that if the methods are not presented in depth in the research paper itself, at least detailed records are kept so that questions going to those methods can be answered. The increasing number of environmental disputes has generated a lawyer-specialist who (a) knows where to find consultants and (b) knows how to use their expertise, in ways which can seriously discredit researchers who are not careful.

Improper cleanup before use of gas chromatography, failure to run blanks or controls, failure to measure other possible stresses on the organisms beside the test toxicant, have either totally impeached or seriously questioned scientific work.

The statistical significance of test results is often taken for granted, yet several witnesses who have appeared in recent EPA hearings have had their published work seriously questioned by skillful use of desk calculators and accepted statistical analyses. Normit, probit and "t" tests are now common terms in lengthy proceedings.

What follows is an excerpt from part of the Aldrin/Dieldrin proceeding. It is not one of the several examples in which the witness was totally trapped by improper methods; it is a more typical case in which a "question" is raised in the mind of the trier of fact:

Q. First of all, I would like to discuss the methodology that you employed in this particular experiment. In particular, I would like to discuss the reliability and the weight to which you give to the levels of dieldrin and aldrin that you found. . . I would like to focus on the methodology.

In particular I want to ask you, Dr. \_\_\_\_\_, whether in the techniques that you employed for analyzing the presence of aldrin and/or dieldrin, whether you used any separation techniques, or so-called clean-up techniques, in order to eliminate the presence of DDE, or PCB, or any other artifacts which could have caused interference on the GLC columns, and, therefore, exaggerated or made too large the results which you found for aldrin and/or dieldrin?

A. Really there are two components to the question. One is the sampling and one is the in-house analysis of the sample.

You are asking once the sample is in-house, and in a correctly identified manner, how it is analyzed?

Q. That is correct.

A. In this particular investigation, some of the peculiarities of saltwater chemistry said it really wasn't that necessary to go through elaborate separation schemes with the type of gas chromatography, the type of detector that

was employed. We did use different columns so we wouldn't catch any of these places where one type of compound overlaps another, or one reacts in a column and produce a spurious peak of one sort or another.

In other types of work, sometimes medium clean-up, extensive cleanup, might be needed, but not in this case.

Q. Are you saying that because the samples were taken from saltwater, in this case it was actual seawater, wasn't it --

A. That is correct.

Q. -- that there were no artifacts that could have been present in the seawater?

A. Oh, there may have been many artifacts. But using the particular column, the inlet design, the type of detector, the sensitivity settings, the thermal settings, flow rates, all of those parameters, there was no interference at this point. There were lots of other items that could be seen on some of the chromatograms, but they weren't of interest for this particular paper.

Q. Did you separate the PCB's from your sample?

A. I really don't recall in this particular case.

Q. You don't recall whether you used separation techniques?

A. No. Let me restate that. I do not recall whether the conditions were such that PCB's were occurring with the detector sensitivities, et cetera. In other words, the conditions under which the instrument was set up. There was no specific procedures, again going through column separations and things of this sort, to try to separate out different groups of compounds in this case.

A. No. Let me restate that. I do not recall whether the conditions were such that PCB's were occurring with the detector sensitivities, et cetera. In other words, the conditions under which the instrument was set up. There was no specific procedures, again going through column separations and things of this sort, to try to separate out different groups of compounds in this case.

Q. You said earlier, I believe, that there was no specific separation of PCB's?

A. In this case.

Q. In this case. Can you state --

A. In other words, we were not looking for PCB's.

Q. I understand that.

Now can you state that it was your belief that there were no PCB's in the samples that you took?

A. No, I have no real feeling one way or the other as to what might have been.

It must be emphasized that a judge cannot easily determine what is "harmless analytical error"; as a lawyer in a strange field, he must rely upon certain procedures which others in the field have called the standard methods for analysis. If the witness cannot tick off the requisite procedures he should be prepared to explain why he used a different method, and preferably be able to point to some published work which sanctions the method he used. There is an aura of "peer acceptability" that surrounds published work which does not attach to unpublished research. If at all possible, the extra time and effort should be made to publish your work, preferably not just in an EPA circular. Although probably unjustified, the greater weight given by lawyers and judges to glossy papered finished reports will no doubt continue.

#### 5. What to Expect in Cross-Examination

When scientists think of trials or administrative proceedings in which they are to appear they may not think of the purpose of the hearing, or even the purpose of his testimony. They may not think of the novel scientific legal issues involved. Often, their main concern is how bad cross-examination will be. To some scientists cross-examination is a forceful wrenching from the world of the reasonable and polite to the world in which word games prevail over accepted fact. In some trials, unfortunately, this has been true.



but a witness can control the cross-examination to a remarkable extent by being adequately prepared. Most of this preparation should be directed by his lawyer, but there are some general points which apply to most situations. The following guidelines have been used in preparing witnesses for the headquarters hearings on pesticides and section 307(a) of the FWPCA:

1. You have no obligation to answer a question which you do not feel qualified to answer. You are not a defendant in a criminal trial required to answer. An "I am not qualified to answer that" or "I do not have enough facts to answer that" is perfectly acceptable.
2. Do not be lured into areas beyond your field.
3. Ask for clarification of a question if you have any doubt what is being asked.
4. When a hypothetical question is posed, make sure all elements of the hypothetical needed for you to be able to answer are present.
5. Take your time in responding to questions.
6. Do not elaborate beyond what is necessary to give a complete answer -- on the other hand, do not allow yourself to fall into trap of giving an "out of context" answer -- an answer which, in and of itself, is true but which has a misleading implication if further comment is not given. If you cannot answer with a "yes" or "no", make it plain you need to qualify your answer.
7. You may be asked to comment on works of other scientists you do not know or have not read recently -- e.g., "I show you this list of pesticide residue figures from Iowa -- aren't they awfully low?" You probably need to know how the research was conducted, the details of the methods, before you can comment accurately.
8. Don't respond to a challenge by boasting.
9. Don't try to render major societal decisions ("all pesticides are bad or corporations mislead the public").
10. You may be confronted with statements made by you at an earlier date which are too broad. If those statements were your personal opinions and not your professional scientific opinion you should say so. Scientists are allowed personal opinions but are allowed to testify in court in opinion and conclusion form only as to matters within their scientific realm, upon which a layman would be unqualified.

11. Don't get angry at the interrogator if he becomes arrogant or insulting. This invariably is because he doesn't have any way to crack your testimony scientifically and is trying to rattle you. Allow your lawyer to attempt to put him in his place.

12. The good lawyer will not ask a question in an opposing party's witness' strongest ground. Do not feel upset if you are not challenged on work you want to discuss.

13. Don't be drawn into an argument with opposing counsel. He isn't being called to testify.

14. If you feel discomfort, ask the judge for a recess. Don't use this as an excuse -- your counsel will ask for a recess if he sees you need a chance to collect your thoughts. Only for necessity will the court interrupt a cross-examination.

15. Most importantly, remember you know more about what you are talking about than anyone else in the courtroom. Your "home ground" is your data -- do not stray too far from it.

There have been notable examples in each major administrative hearing held by EPA or court trial in which EPA was a party, of witnesses who have fallen into one or more of the traps mentioned above.

The ideal expert witness has facetiously been characterized by some as a white haired gentleman with a pipe and elbow patched tweed sport coat who understates most answers he gives and never changes his mood of academic detachment. This picture is not altogether misleading, for the best expert witnesses seem to be those who are never caught exaggerating, never lower themselves to the rancor of the hearing room, and never deviate from their area of expertise. Judge E. Barrett Prettyman gives this advice to experts:

Don't argue. Don't fence. Don't guess.  
Don't make wisecracks. Don't take sides.  
Don't get irritated. Think first, then  
speak. If you do know the answer to  
a question, say so. If you do not know  
the answer but have an opinion or belief  
on the subject based on information, say  
exactly that and let the hearing officer  
decide whether you shall or shall not give  
such information as you have. If a 'yes  
or no' answer to a question is demanded but  
you think that a qualification should be  
made to any such answer, give the "yes or  
no" and at once request permission to ex-  
plain your answer. Don't worry about the

effect an answer may have. Don't worry about being bulldozed or embarrassed; counsel will protect you. If you know the answer to a question, state it as precisely and succinctly as you can. The best protection against extensive cross-examination is to be brief, absolutely accurate, and entirely calm.

The skillful witness also knows when to concede a point, even if it reflects poorly on his work. To struggle with a lawyer on a line of questioning, only to agree with him later, highlights the concession and places the other answers of the witness in an unfavorable light. What follows is the aftermath of a cross-examination on a point on which a witness refused to yield until the last possible moment. The expert then became argumentative and refused to answer questions clearly within his area of expertise. The questions deal with possible sources of dieldrin found along the Atlantic coast:

Q. Looking at Table 5, I notice that New York is the most frequent reporter of residues of dieldrin in mollusks. Are you able to account for that?

A. No; that is an interesting observation, but I am not able to account for it.

Q. Why is it interesting?

A. It just interests me as a person.

Q. What does it suggest to you?

A. I have no further comment.

Q. Refer to the New York section of the paper. This begins at page 303.

A. Yes.

Q. You will notice the sites of the monitoring stations are fringed around the island of Long Island, not notorious as one of the world's great feed corn granaries. Does that suggest anything to you?

A. I am not in position to comment on that.

Q. You are not even in position to comment on whether or not these sites are adjacent to urban areas?

A. No comment.

Q. No comment?

A. No.

Q. Are you able to comment, for example, with respect to page 304 and let's say, for example, the Mamaroneck data which shows residues, if you allow a subjective judgment, for example, in 1967, a fairly constant rate throughout the year and tell us whether or not that indicates to you that these are agricultural or nonagricultural sources?

A. No, I have no basis for comment.

Q. Let's go back to page 243 and notice in the next column of Table 5 that Georgia is the state reflecting the maximum value in ppb. Are you able to comment about that?

A. No, I am not.

Q. If you will turn to the Georgia section and particularly the Lazareth Creek data, Station Number 1, for example; are you able to advise us as to the existence of one or more wool treatment plants on this creek?

A. No, I am not.

To some people, giving testimony as an expert witness is a challenging experience which starts the adrenalin pumping and prompts an attempt to answer all questions which are posed. A good lawyer will endeavor to draw an expert away from his area of expertise to a topic on which the witness knows enough to want to answer the questions but not enough to avoid being trapped. The witness also can be led into this unfortunate situation by a client and lawyer who wish to prove a point by forcing the witness to "expand a little upon this expertise." The example which follows is of a witness who rose to bait offered by the interrogator. The witness, who was a chemist, had just presented data on the runoff of pesticides from a cornfield during a heavy rain.

Q. Over the course of five years, Doctor, how many days would you expect that kind of rainfall to occur of that intensity? Did you have any way of making an estimate? Iowa weather?

A. Yes, I could make an estimate.

Q. Out of five years, what would your estimate be?

A. Well, I won't be numerical.

Q. Well, could you try -- how many days?

A. With considerable frequency. It is not uncommon. Several times a year, at the appropriate seasons; sometimes a couple of times a week it's happened.

\*\*\*\*\*

Q. Would you identify that for the record and tell me what you see, whether you recognize that?

(indicating.)

A. Yes, I recognize it. It is a publication, 1969, by the Iowa Academy of Sciences, entitled, "Water Resources of Iowa."

Q. Now I direct your attention to figure 8, done in exactly the same method.

A I understand this figure, Doctor, and I ask you to correct me if I am incorrect, we can expect a four-inch rainfall in a 24-hour period once in five years; is that correct?

A. Yes, sir.

Q. Thank you.

The second example of a witness leaving his area of knowledge was probably the fault of his lawyers, who assisted in the drafting of an overly-broad written statement. The witness was attempting to rebut an EPA position in the Aldrin/Dieldrin hearings that much if not most of the residues of these pesticides come from agricultural runoff rather than point sources. Shell Chemical Company was attempting to show that sloppy handling by formulation and fertilizer blenders was the cause of the pollution. (If this were so, the argument goes, EPA could reduce pollution measurably by enforcement actions against certain plants and would not need to ban the pesticide. Another more immediate purpose was to throw doubt upon the EPA studies showing high residues in those agricultural areas in which Aldrin is used.) A company chemist was put in the uncomfortable position of carrying this torch:

Q. Are any of your publications related to the material you talk about in your statement?

A. No.

Q. So to shorten this up you have never published in the fields of -- stop me if you have, I am just going to read a list, aquatic toxicology, kinetics of aldrin-dieldrin degradation, the adsorption of aldrin-dieldrin to soil particles, erosion problems, the fate and effect of aldrin-dieldrin in fresh water moving stream environment, or the relationship between turbidity and aldrin-dieldrin concentrations in a moving fresh water stream.

Have you ever published in those areas?

A. No.

Q. Do you know how many tons of soil leave an average American corn field according to the U. S. Department of Agriculture?

A. No.

Q. Don't you think that would be a good figure to have in mind when you are talking about the relative pollution of Iowa corn streams?

\*\*\*\*\*

A. I don't see the need to know that figure.

\*\*\*\*\*

Q. Did you have any data on the distance an aldrin or dieldrin molecule can be transported in various size streams?

A. No. But I would guess it could go from one end to the other.

\*\*\*\*\*

Q. You have no data on that, do you?

A. No.

Q. You have no data on how far it would travel in a highly turbid drainage ditch or turbid Iowa stream of 500 cfs, do you?

A. No.

\*\*\*\*\*

Q. Doctor, do you have any example of a number in parts per million or pounds per day for any formulating plant in the Midwest at any time of the year?

A. No.

Q. Do you have any number for the pounds per day or parts per million from any municipal outfall in the Midwest?

A. No.

Q. Dr. \_\_\_\_\_, have you been in any of the eight major Shell formulating plants in the United States?

A. No.

\*\*\*\*\*

Q. Let me run to Figure C, the map of fertilizer blenders, and so on. I take it you have no knowledge of whether the formulators on that map ever discharged a drop of dieldrin to the water, is that correct?

Q. I mean in normal operations.

A. I have no personal knowledge.

Q. And you have no knowledge of any type of numbers in parts per millions or pounds per day from any of these plants?

A. No.

Q. So, you do not know if they are polluting the water in Iowa or not, basically, do you? They could be all closed systems for all you know, right?

## A. Right.

There are, unfortunately, many examples of expert witnesses who have violated one or more of the fundamental rules for presenting evidence. The chances of doing so, however, are far less if the potential witness has viewed at least a day or more of the proceedings prior to giving testimony. This accomplishes several things: it gives the "tone" of the hearing, it usually indicates what general type of questions to expect, and most of all, it reassures the witness. If you are called upon to testify you should make every effort to arrive enough before your appearance to view the proceedings.

Unfortunately, simple fatigue can undo the best of research. Experts have likened giving testimony before good lawyers to a lengthy oral dissertation defense without the usual opportunity to give complete answers. By the end of a day of hard questioning, the witness' concentration and the precision of the answers fall off markedly. Good lawyers may save the most aggressive and most important questioning for after the midafternoon break. It is also at this time that the skillfully phrased leading question has its greatest effect. Lawyers are not allowed to "lead" their own witnesses, but may phrase long rhetorical questions when facing witnesses for the opposition. These often begin with "I take it we can agree that..." or "I assume you are aware that..." or some form of a lead-in which calls for a yes or no answer to an often lengthy proposition. The prepared cross-examiner will know where he wants to go, and roughly how many leading or hypothetical questions it will take to get there. In most cases the final answer will not be the conclusion the witness anticipated when he conducted his research, i. e., it may be a consistent extrapolation from his original work. Or it may be a conclusion not truly in line with the data, but the inevitable result of the skillful questioning.

The latter result, most frustrating to good scientists, can happen when the leading or hypothetical questions are 95% accurate and the respondent is either too tired or too timid to demand the correction of the 5%. As any scientist knows, a 5% error compounded several times leads to substantial deviation: this simply is what happens when a witness is not careful with leading questions. He should demand that all elements of a hypothetical question he needs to reply are indeed included in the question or that all elements of a leading question do indeed reflect the state of facts. This training best comes from actual experience, but intensive mock cross-examination by his own lawyer can give a fair idea of what to expect.

It is often a good idea at the end of a day of hearing or trial for attorney and witness to review the past testimony in addition to preparing for likely cross-examination to come the next day. Witnesses and their lawyers often disagree as to what was said, or how it was interpreted, or whether that was really what the witness wanted to say. If there has been testimony that could be misinterpreted or was simply mis-spoken, the government attorney should try to correct the misimpression by well phrased "re-direct" question. These are traditionally questions which



deal with issues raised in the cross-examination, not with "new matters". It is helpful to trial counsel if the witness keeps a mental note of areas of cross-examination in which he feels he needs to say more, and if the witness can suggest appropriate questions to his lawyer.

In some of the bigger trials and trial-type administrative hearings in which EPA has been a party, a daily transcript is made and is usually available to the parties four or five hours after the close of the day's hearings. Reference to the actual recorded answers, of course, greatly facilitate the correction of misimpressions and the protection of a precise record.

## Appendix A

### STATEMENT OF \_\_\_\_\_

My name is \_\_\_\_\_. I am a physiologist at the Fish-Pesticide Research Laboratory of the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior at Columbia, Missouri. My duties there involve supervisory physiological, histopathological, and nutritional research dealing with the chronic effects of environmental pollutants on the physiology and biochemistry of fishes. I have been employed by the Fish-Pesticide Research Laboratory since 1969.

My educational background is as follows: I received my B.A. in Biology from Southwestern at Memphis, Memphis, Tennessee, in 1967, my M.A. in Zoology in 1969 and my Ph.D. in Agricultural Chemistry in 1971 both from the University of Missouri at Columbia.

My testimony will be taken from three papers which I coauthored. These are:

1. "Serum Amino Acids in Rainbow Trout (*Salmo gairdneri*) as Affected by DDT and Dieldrin" which appeared in Comparative Biochemistry and Physiology in 1971, Volume 38B, pages 373 to 377. This is attached as Appendix A.

2. "Ammonia Detoxifying Mechanisms of Rainbow Trout Altered by Dietary Dieldrin", a manuscript accepted for publication in Toxicology and Applied Pharmacology. This is attached as Appendix B.

3. "Phenylalanine Metabolism Altered by Dietary Dieldrin", appeared in Nature, Vol. 238, pages 462 to 463 in 1972. This is attached as Appendix C.

My papers deal with the effect of dieldrin on amino acid metabolism, ammonia detoxifying mechanisms, and phenylalanine and phenylketo acid metabolism of rainbow trout.

### DIELDRIN AND AMINO ACID METABOLISM

Amino acids are organic molecules which are utilized for energy as well as for molecular components of proteins. Proteins are exceedingly important to all living organisms; they serve both structural and functional capacities in living organisms. The twenty naturally occurring amino acids normally found in organisms are considered important building blocks for life processes. Thus recognizing the importance of amino acids in biological systems, we initiated studies to elucidate the effect of dieldrin, a common environmental contaminant, on amino acid metabolism of rainbow trout.

Each of three groups of rainbow trout was fed a diet containing 7.1 ug DDT/gm food, 7.1 ug dieldrin/gm food, or a diet containing neither DDT or dieldrin (control group). The dieldrin dosage was 143 ug/kg body weight per day. The fish were fed in three separate 570 liter fiberglass tanks for 140 days. After 140 days, whole body residue analyses were performed on 4 fish from each group, serum amino acids were analyzed from 6 fish in each group, and 12 trout from each group were subjected to forced swimming to determine the effects of DDT and dieldrin on serum amino acids after the trout were exercised. Six fish from each group were analyzed after 6 hours and 6 fish after 24 hours of forced swimming. The fish were exercised by placing them in a stamina tunnel which forces the trout to swim against a current of water. The velocity of water was 2 ft/sec, which is similar to velocities encountered by trout in many natural streams. Appendix A contains the references for the methods used. Table 1, Appendix A, presents the results of this study.

The concentration of each amino acid in the control group, except alanine, decreased after the fish were exercised. It is assumed that this is a result of the fish's energy needs, i. e., amino acids were being utilized in response to forced swimming.

Dieldrin altered the concentrations of 11 amino acids. The level of seven amino acids and the total amino acids concentration were elevated, while the concentration of four other amino acids were decreased by dieldrin. The effect of dieldrin could have been on the amino acid in question or perhaps on a metabolic pathway which affects a particular amino acid via a "feedback" mechanism.

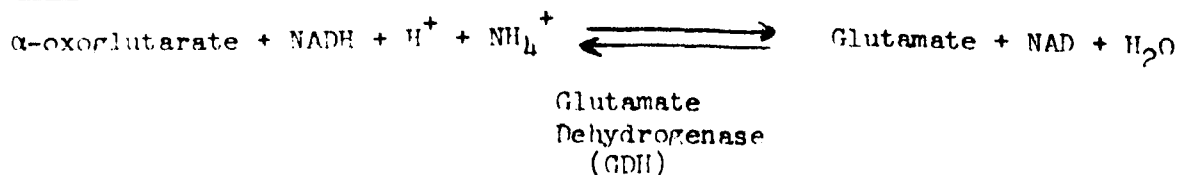
There was a significant interaction between dieldrin treatment and forced swimming. The concentration of fewer amino acids were significantly lower after exercise in the dieldrin group than in the control group. Leucine and serine did not decrease in either of the exercised dieldrin groups, whereas in the control exercised group both amino acids significantly decreased. The concentration of methionine, hydroxyproline and aspartate increased in the dieldrin exercised group, but decreased in the control exercised group. The accumulation of these five amino acids in the serum suggests that the utilization was inhibited by dieldrin. The mechanism that caused these dieldrin-induced changes is unknown, but our results can be considered indicative of the subtle, biochemical effects of dieldrin that may alter rainbow trout in our aquatic environment.

DDT also had a significant effect on amino acid metabolism, but these results will not be discussed in this testimony.

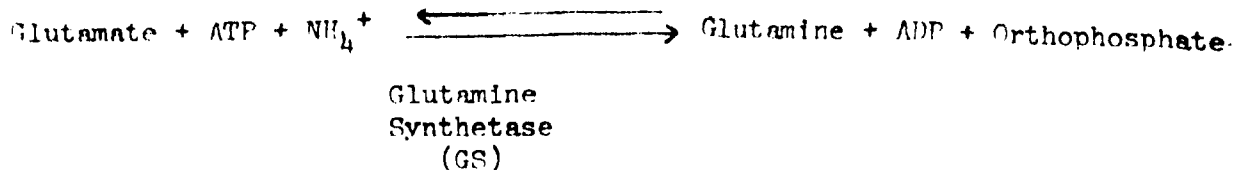
#### DIELDRIN AND AMMONIA DETOXIFICATION

The second study involved the relationship between dieldrin and ammonia metabolism in fish. Ammonia is a natural end-product of protein and amino acid metabolism, and it manifests a strong cytotoxicity in living cells. The following biosynthetic reactions are responsible for detoxifying and maintaining low, non-toxic levels of ammonia in fish:

### Reaction 1



### Reaction 2



Reaction 1 occurs in both the liver and brain of fish, whereas the second occurs only in the brain. Thus, the brain has both biosynthetic reactions, and the liver has only one. Regulation of these two reactions is extremely important in maintaining low, non-toxic, ammonia levels in fish. This study was initiated to elucidate the effects of dieldrin on the ammonia detoxifying mechanisms and brain amino acid metabolism of rainbow trout.

Each of five groups of rainbow trout was fed a diet containing 0, 0.36, 1.08, 3.6 or 10.8  $\mu\text{g}$  dieldrin/gm of food. This equals to 0, 14, 43, 143 or 430  $\mu\text{g}$  dieldrin/kg body weight of fish per day. The trout were fed daily rations equivalent to 4% of their body weight per day for 240 days, after which liver, blood and brain were taken for biochemical analyses. Each group of fish was weighed monthly and feeding rates were adjusted accordingly during the exposure.

The activity of the enzymes glutamate-oxaloacetate transaminase (GOT), glutamate-pyruvate transaminase (GPT), and glutamate dehydrogenase (GDH) were measured in both the liver and brain of fish from each group after 240 days. Also, glutamine synthetase activity (GS) (measured as glutamine transferase) was measured in the brain of fish from each group. The methodology, results, statistics, and discussion of data are presented in Appendix B. A summary of the data along with implications will be presented in this testimony.

The whole-body dieldrin residues after 240 days of exposure were 0.39, 0.62, 2.0, and 5.86  $\mu\text{g/gm}$  (ppm) in the 14, 43, 143, and 430  $\mu\text{g/kg}$  dosage groups, respectively. The dieldrin residues resulting from the three lowest dosages were in the range of those reported in fish from the National Pesticide Monitoring Program. We therefore suggest that results from this study are indicative of biochemical effects of dieldrin that could be occurring in fish in our aquatic environment.

Liver GOT and GPT activities were not significantly altered by dieldrin except for GOT in the highest dosage group. These two enzymes are indicative of the amount of ammonia being transaminated by the liver. These results suggest that dieldrin did not alter the transamination of amino nitrogen in the liver. However, brain GOT and GPT activities were significantly decreased by dieldrin except for GOT activity in the lowest dosage group. Decreased activity of these enzymes could cause a concomitant increase in concentrations of the amino acids aspartate and alanine. Analyses of the concentration of free amino acids in the brain confirmed that both aspartate and alanine concentrations were significantly increased in fish from the two highest dosage groups, but not in those fed less than 143  $\mu\text{g/kg/day}$  (3.6  $\mu\text{g/gm food}$ ). Nine of the 16 amino acids measured in the brain were altered in the 143  $\mu\text{g/gm}$  group, whereas 12 of the 16 amino acids were altered in the 430  $\mu\text{g/kg}$  group. The significance of these individual changes in amino acid concentrations is not completely understood, but we can conclude that brain amino acid metabolism was significantly altered by chronic, dietary dieldrin exposure.

The enzymes concerned directly with ammonia detoxification, GDH and GS, were significantly altered by dieldrin. Liver GDH was significantly stimulated by all dieldrin dosages, which suggests that the ammonia detoxifying capabilities of the liver were increased. Because GDH is located exclusively in the mitochondrial matrix, these data indicate that mitochondrial metabolism was stimulated by dieldrin.

Electron microscopic analyses of liver cells showing changes in mitochondrial morphology give further evidence that dieldrin has an effect at this site. An electron photomicrograph representative of the control group (0 dosage) is shown in Figure 1, Appendix B. In comparison, the lowest dieldrin dosage caused swelling of mitochondria with no apparent disruption of membranes (Figure 2, Appendix B). However, the highest dieldrin treatment caused more pronounced effects on the mitochondrial (Figure 3, Appendix B). The mitochondria were swollen, mitochondrial membranes were disrupted, and the matrices of several mitochondria appear severely damaged. The electron microscopic examinations were correlated with the altered GDH activity, and our interpretation offers an explanation as to why the lowest dieldrin-treated group had slightly greater GDH activity than the highest treated group. The mitochondria of the low dosage group were swollen, which suggests stimulated mitochondrial metabolism, whereas those of the high dosage group were not only swollen, but the outer membranes were disrupted which results in the mitochondria being inactive.

Brain GDH activity was decreased significantly by all doses of dieldrin. The inhibition of brain GDH suggests decreased ammonia detoxification, which could have increased ammonia concentrations in the brain. However, dieldrin had no effect on brain ammonia concentrations. In contrast, serum ammonia increased significantly at the two highest doses of dieldrin. Because brain ammonia is metabolized sequentially by glutamate dehydrogenase and glutamine synthetase, we feel that the inhibition of GDH activity placed a greater load of ammonia on the glutamine synthetase system. In all groups exposed to dieldrin, glutamine synthetase activity (as assayed by glutamine transferase) was stimulated, and compensated for the loss in ammonia detoxifying function

performed by GDH. Thus, glutamine synthetase in the brain of dieldrin-dosed fish in this study is likely responsible for maintaining brain levels of ammonia within physiological limits. When this compensating mechanism is exhausted or exceeded, then the toxic effects of ammonia are perhaps manifested.

The dieldrin-induced change in brain GDH activity of rainbow trout may account for the stimulation of brain glutamine synthetase activity, increase in serum ammonia, and the increase in liver GDH activity. The ammonia liberated from the brain in the low dosage group (14 µg/day) did not result in a detectable increase in the concentrations of either brain or serum ammonia. This suggested that the ammonia liberated due to decreased brain GDH activity was either bound by brain glutamine synthetase or transported from the brain to blood, and then either excreted or detoxified by the liver. The ammonia liberated from the brain probably accounted for the stimulated liver GDH activity. In the second lowest dosage group (43/day), this same trend was apparent. The two highest doses of dieldrin (143 and 430 µg/day) caused an increase in serum ammonia, which suggests that the excretion and liver detoxification capabilities were being exceeded. Although the excess ammonia load was not toxic to the trout, it caused the ammonia detoxifying mechanisms to be continually taxed.

The implication that brain ammonia detoxifying mechanisms of fish play such an important role in maintaining ammonia levels within physiological limits demonstrates the impact that dieldrin could have on fish and their ability to adapt to their environment. However, the most serious implications on fish involve the interaction of dieldrin and other environmental chemicals that may also alter ammonia metabolism, as well as the interaction of dieldrin and elevated ammonia concentrations in water. Ammonia is one of the most common poisons discharged into the aquatic environment and has been a subject of much concern in fish toxicology. Results from our study suggest that fish carrying body burdens of dieldrin would be less tolerant to increased levels of ammonia in water.

#### DIELDRIN AND PHENYLALANINE METABOLISM

Further research was done with rainbow trout which involved determining the effects of dietary dieldrin on the metabolism of one particular amino acid, phenylalanine. The concentration of phenylalanine was altered by dieldrin in our first study. Changes in the metabolism of phenylalanine have been related to altered activity of brain enzymes and mental deficiency in mammals. Although little is known about the situation in fish, we evaluated the effects of dietary dieldrin on metabolic pathways of phenylalanine in rainbow trout (Salmo gairdneri).

In this experiment, we fed each of 5 groups of rainbow trout diets containing dieldrin at the following concentration: 0, 0.36, 1.08, 3.6 or 10.8 µg dieldrin/gm food. This corresponded to 0, 14, 43, 143, or 430 µg dieldrin/kg body weight/day, respectively. The fish were fed daily rations equivalent to 4% of their body weight for 300 days. The trout were weighed each month, and we adjusted the feeding rates accordingly.

At the end of the experiment liver phenylalanine hydroxylase, serum phenylalanine and urinary phenylpyruvic acid were measured. The techniques used in this study are noted in Appendix C.

Growth rates were not affected during the 300 day exposure period. Whole body dieldrin residues after 300 days were 0.41, 0.79, 2.10 and 6.23  $\mu\text{g/gm}$  (ppm) in the 14, 43, 143, and 430  $\mu\text{g/kg}$  groups, respectively. It is important to note that residues in fish at the three lowest exposure levels were in the range reported for fish in the aquatic environment by the National Pesticide Monitoring Program.

The concentration of phenylalanine in blood was increased by all dosages of dieldrin. The effects of dieldrin on serum phenylalanine are given in Figure 2, Appendix C.

Liver phenylalanine hydroxylase is an enzyme which converts phenylalanine to tyrosine. This enzyme is responsible for maintaining the normal concentration of blood phenylalanine. Our study showed that all doses of dieldrin decreased the activity of this enzyme (Figure 1, Appendix C). These results are consistent with our finding of increased serum phenylalanine, i. e., the enzyme was less active and phenylalanine was not being converted to tyrosine.

Dieldrin's effect on phenylalanine hydroxylase activity appeared to be persistent, for the liver enzyme activities in the group given the largest and smallest doses of dieldrin were still significantly ( $P < 0.05$ ) lower than the control group after the trout were fed control diets (0 dosage) for 4 months after the initial 300-day exposure. The half-life of dieldrin in trout has been reported to be 44 days. Thus, after approximately three half-lives, the enzyme activity was still decreased.

Urinary phenylpyruvic acid, a phenylketo acid metabolite of phenylalanine, increased in concentration in the groups receiving the three highest dosages of dieldrin. There was a significant correlation between decreased phenylalanine hydroxylase activity and increased urine phenylpyruvic acid concentration among the various dosage groups ( $r = 0.860$ ,  $P < 0.01$ ). Thus, as dieldrin caused a decrease in hydroxylase activity, there was a concomitant increase in the urinary phenylketo acid metabolite.

Phenylketouria is an inherited defect in phenylalanine metabolism of mammals characterized by an inhibition of phenylalanine hydroxylase, increased blood phenylalanine, increased urinary phenylketo acids, and mental deficiency. Our study indicated that dieldrin has a marked effect on phenylalanine metabolism and can induce the biochemical manifestations of phenylketouria; however, the effects of dieldrin on learning ability in fish remain to be tested.

## Appendix B

My name is \_\_\_\_\_ and I am currently assistant professor of environmental studies at \_\_\_\_\_. My formal education includes BSc and MA degrees from the University of Missouri and a PhD degree from Montana State University. I have had experience as a research assistant at the University of Missouri and as a pollution biologist with the Tennessee Game and Fish Commission. A list of my research contributions and a curriculum vitae are attached for your review. The information I will present below stems from a research project conducted at the University of Missouri during the late 1960's under the supervision of \_\_\_\_\_. This work dealt with the effects of selected pesticides (including dieldrin) on planktonic algae.

As you know, all life on this planet depends upon the energy of the sun which is "fixed" or converted into a useable form via the activity of green plants. Our goal in this research project was to determine if certain chemicals, which were widely used at the time of the project had any effect upon the ability of green plants to perform their important role of energy fixation. We choose a green algae (Scenedesmus quadricauda) as the test organism. Our experimental design consisted of exposing laboratory cultures of this plankton organism to various concentrations of specific pesticides and over a period of approximately 10 days determining what influence, if any, that chemical had on the ability of the test organism to grow (i. e., increase in numbers within the cultures) and to fix energy. The methods used during this study were such that sublethal effects of any of the tested compounds could be determined. In other words, the test organism did not have to turn brown and die in order to determine whether or not the compound under investigation had an adverse effect.

Growth was measured simply by counting the number of plankton algae cells in a 1 ml aliquot of the control and pesticide treated cultures at two day intervals. The rate of energy fixation (photosynthesis) was determined with the aid of radioactive carbon-14 ( $C^{14}$ ) in the form of sodium carbonate. Aliquots of each culture were withdrawn at two day intervals and incubated with  $C^{14}$  for four hours. The cells were filtered, washed, dried and the amount of radioactive carbon which had been "fixed" was determined by liquid scintillation.

A summary of the results from the dieldrin part of the study are presented in Table I.



**Table 1.** Percentage differences cell number, carbon assimilation and biomass between dieldrin treated cultures and controls at 0, 2, 4, 6, 8, and 10 days. Carbon assimilation expressed as unit volume = cpm  $C^{14}$  per 50 ml of culture. \* = significant difference ( $p = 0.05$ ,  $N=4$ ).

	Time in Days					
0.1 mg/l	0	2	4	6	8	10
Cell number		-32*	-23*	-26*	-17*	-9
Unit volume	+5	+ 1	-20*	-42*	-25	+35
Biomass						-22
1.0 mg/l						
Cell number		-37*	-29*	-38*	-23*	-11
Unit volume	+3	+ 1	-33*	-51*	-32*	+33
Biomass						-32

These data show the percentage change of treated cultures from controls as to the number of cells, the amount of carbon-14 taken up and the biomass. Thus, by the second day of the experiment, the number of cells in the dieldrin treated cultures (0.1 mg/l) was 32% less than the control cultures while the amount of radioactive carbon being assimilated was about the same (1% greater than controls). At a concentration of 1.0 mg/l on this same day, the number of cells was 37% less than the control cultures and again carbon uptake was about the same (1% greater than controls). By the sixth day of the experiment cell number at the lower concentration (0.1 mg/l) was 26% below the controls and the rate of carbon fixation was 42% less than the control cultures. At the higher concentration of 1.0 mg/l the number of cells in the treated cultures were 38% lower than in the control cultures and the rate of carbon uptake 51% below the control rate. By the end of the experiment, total biomass was 22% lower than control cultures in the 0.1 mg/l treatment group and 32% lower in the 1.0 mg/l group.

My conclusion from this information is that the compound dieldrin has an adverse effect on the green plankton algae *S. quadricauda*. There was a significant decrease in the growth and energy fixing abilities of the test organism. Total biomass of the treated cultures was lower than controls at the end of the test period.

I feel that dieldrin has fairly widespread effects. As other witnesses have testified, this compound affects many diverse types of organisms. As I have found, members of the plant kingdom are adversely affected. The

ramification of this is that dieldrin may have a very subtle yet widespread influence on an ecosystem. I therefore would support a complete ban on the pesticide dieldrin while encouraging an increased research effort into more species-specific pest control methods.

CHAIN OF CUSTODY RECORD		
ENVIRONMENTAL PROTECTION AGENCY		
SAMPLE NO.	TIME TAKEN	DATE TAKEN
SOURCE OF SAMPLE		PRESERVATIVE
NAME OF PERSON TAKING SAMPLE		
WITNESS(ES) TO TAKING SAMPLE		
ANALYSIS REQUIRED:		

Front

RECEIPT OF SAMPLE	I hereby certify that I received this sample and disposed of it as noted below.		
	RECEIVED FROM	DATE REC'D	TIME REC'D
RECEIPT OF SAMPLE	DISPOSITION OF SAMPLE		SIGNATURE
	I hereby certify that I received this sample and disposed of it as noted below.		
DISPATCH OF SAMPLE	RECEIVED FROM	DATE REC'D	TIME REC'D
	DISPOSITION OF SAMPLE		SIGNATURE
	I hereby certify that I obtained this sample and dispatched it as shown below.		
	DATE OBTAINED	TIME OBTAINED	SOURCE
	DATE DISPATCHED	TIME DISPATCHED	METHOD OF SHIPMENT
	SENT TO		SIGNATURE

Back

# Appendix D

## SAMPLE TRANSMITTAL SHEET

TO: (Laboratory Name & Address)

FROM: (Field custodian or Field Sampler)

<u>Sample No.</u>	<u>Lab Number</u>	<u>Preservative</u>	<u>Analysis Required</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

To be completed in field:

Prepared by: \_\_\_\_\_  
Signature

Date: \_\_\_\_\_

Field Notebook No. \_\_\_\_\_

Time: \_\_\_\_\_

To be completed by Laboratory:

Received by: \_\_\_\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Distribution: Orig. & copy - Accompany shipment  
1 copy - mail directly to Laboratory  
1 copy - mail to Data Management  
1 copy - Survey Coordinator Field Files

D-2

THE OPACITY WITNESS

Kenneth B. Malmberg  
Division of Stationary Source Enforcement

THE OPACITY WITNESS

Introduction

This guideline is intended to assist the EPA employee in a civil or criminal action in which he may be called as an opacity witness. It summarizes the EPA witness' presentation of opacity testimony in a format which can easily be interpreted by judges, juries, and counsel. This testimony can be supplemented by exhibits which clarify and present opacity data in its simplest and most easily understood form.

While other witnesses may be called to testify on rules, regulations, administrative procedures, process variables, or unit process operations, testimony on opacity evidence may be the most far-reaching in terms of varieties of issues discussed. Because opacity is one of the most universally applicable emission regulations, the EPA employee presenting opacity evidence should be prepared to address diverse and sometimes controversial issues.

## THE OPACITY WITNESS

A person testifying on visible emission evaluations (i.e., opacity evidence) should be familiar with the development of visible emission evaluation procedures and their application. As a witness, you may be questioned in the following areas:

1. Specific observation procedures you followed in the field.
2. The accuracy of the opacity method as applied to industrial sources.
3. The accuracy of Method 9 as promulgated in the Federal Register on December 23, 1971, and revised November 12, 1974.
4. Revisions to the method including the following specific issues:
  - a. The averaging approach to determining compliance;
  - b. The potential effects of changes in observer position and weather conditions;
  - c. The potential effects of water vapor on opacity.

5. The training you received for certification by EPA.
6. The compilation of opacity data and its presentation.

It may be necessary in presenting opacity evidence that you discuss some or all of the above issues as an expert witness.

#### A. ISSUES

A major substantive area into which both sides will delve is the one of qualifications. You must always present an accurate summary of your qualifications to your attorney prior to your testimony. Your summary of experience differs from a resume in that it describes those specific qualifications which enhance your credibility and general ability to discuss opacity issues and to answer questions on the subject of visible emissions with a high degree of confidence. Include a summary of all relevant work performed either in your present position or elsewhere, with reference to previous expert testimony, writing in the field, and any public presentations you have made regarding opacity techniques or procedures. This summary should be brief, and not over one page in length, in most cases.

On a motion to postpone the trial the judge may change the original trial date so that witness qualifications can be examined both by himself and by the defense. Should



this occur you may meet in the judge's chambers for a verbal examination, in which the judge may ask various questions about your experience, training, background, and perhaps some questions relevant to the case at hand.

Other relevant issues are:

1. Training - The adequacy of observer training is always subject to scrutiny. In anticipation of these questions, you can be particularly helpful before trial. Well before trial you should ask your attorney whether or not a demonstration of visible emission evaluation procedures could be of benefit to the court. This demonstration could include a visual demonstration to the judge and the jury of correct opacity reading technique. It could be supplemented by films, pictures, and in-court demonstrations illustrating equipment used in visible emission certification procedures. At the very least this area of field procedures should be fully discussed between you and your attorney prior to any cross examination by the opposing counsel.

2. Accuracy - The Portland Cement Association's remand response<sup>1</sup> clarified EPA's position regarding the accuracy of visible emissions evaluations. In this document EPA tests showed an overwhelming majority of observations made by certified opacity observers were well within the standard for certification. You should stress the point that these data also show that the error factor is biased downward (that is, in favor of the emission source), when evaluations are made under meteorological conditions considered less than ideal. If these points are clearly presented little doubt can remain regarding the accuracy of opacity evaluations.

3. Method 9 - The opacity method itself is also a subject for witness examination. The method<sup>2</sup> as promulgated in the Federal Register is clear in its applicability procedural, and testing segments. The averaging concept

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<sup>1</sup>Response to Remand by U.S. Ct. of Ap., re "Portland Cement Association v. Ruckelshaus", ESED, EPA, RTP, North Carolina 27711. EPA 450/2 74023. November 1974.

<sup>2</sup>Visual Determination of the Opacity of Emissions from Stationary Sources, 40 CFR 60, Appendix A.

is particularly adaptable to continuous emission from an emission source. As described in Section 2.5, the averaging process must be thoroughly understood prior to any attempt at presenting evidentiary data derived by its application. Therefore your presentation must stress its basic simplicity. You must make every effort at presenting your data clearly, accurately, and in a simple manner. Included among changes to the method is a six-minute averaging procedure. You must insure that these revisions are thoroughly explained and understood by everyone prior to your examination on the stand.

4. Data Presentation - Implicit in the presentation of opacity evidence is the citation of opacity data which is claimed to be over the standard called for in the regulation. You can assist your attorney by clarifying your technical reports and providing a concise format for presentation of data which clearly shows:

- a. the alleged violations;
- b. the extent of those violations (both the number of evaluations and their excess over the standard);

- c. the six-minute average of those evaluations,  
if applicable and;
- d if applicable, the number of evaluations  
exempted by the particular state regulations.

In addition, you could supply a narrative report tying in the particular state opacity regulation to the reading made. For example, many state opacity regulations have differing applicability requirements. Clearly understanding these regulatory applications is important for development of an acceptable opacity enforcement case

5. Review of Testimony - Before taking the stand as a witness, you should review the testimony of prior witnesses with your attorney if possible. This will assure your complete understanding of facts testified to previously.

#### B. TESTIMONY

Since you have presented a description of your qualifications, questions in this regard will be brief and to the point. The intent of these questions is to put aside any suspicions in the minds of the judge or the jury. Your answers should be as accurate and as well founded as was your original discussion of this information with the

attorney handing the case. You may then be asked to discuss the procedures you followed in evaluating visible emissions from this source, with particular emphasis on any deviations from procedure which you found necessary. As an expert you may be asked your opinion freely, if asked, based upon your most professional judgment. On cross examination the defense attorney will try to discredit testimony you previously gave by placing you in the position of making a contradictory statement or taking a position which is not based on your specific areas of expertise. It is important that you do not depart the narrowed area of your expertise. You should avoid discussions based on particle sizing, particle distribution, particle reflectance and dispersion, process operations, process effluent characteristics, process efficiencies, etc., unless you feel fully qualified to discuss these items.

The defense may also include remarks based on irrelevant subjects which may be disconcerting to you at the start, but as an expert witness you must remain calm and confident that your counsel will not allow questions of this type to detract from the case. Should it occur consistently, the judge will

disallow a line of questioning if it appears inappropriate or inconsistent. The judge himself may wish to take up examination of a witness already on the stand, if he sees fit. This will occur if the judge wants a particular point developed or expanded to clarify the facts for the jury.

Juries deserve discussion here because they are asked to decide questions of fact. Your testimony will for better or for worse influence that decision. Both the type of evidence regarding opacity evaluations and confusing defense presentations sometimes confuse a jury. Therefore your presentation of opacity evidence must not place your testimony in a negative light by a jury which may already be confused. Do not try to judge their ability to digest your testimony. The questions, your answers, the courtroom setting are all influences on the jury's final decision. Therefore, your answers should be structured as simple and precise as possible for a layman's comprehension.

There are many excellent discussions on the correct demeanor of a witness while on the stand., One which is outstanding is that contained in Part III of the course manual for "Air Pollution Field Enforcement," Air Pollution Training Institute, U.S. EPA, 1972.

Questions in chambers by the judge with both opposing parties present has become more significant as a part of

judicial proceedings involving technical issues. Judges must have substantive answers to their inquiries based on their sometimes limited knowledge of the technical portion of a case which is based on air pollution violations. These sessions owe their productivity to the fact that the unique knowledge of the parties involved will allow a more freewheeling and intensive discussion on a given point, beyond the hearing of the jury and courtroom. Since such questions can assume the same form as questions asked on the stand, as an opacity witness you should conduct yourself as if you were under oath without any bias toward either side and answer the questions as clearly and completely as possible. Questions may be asked to determine applicability of certain rules of law, and the judge may adjourn the court until he can make a decision about a point of law. A transcript will also be made of these in-chambers questions and answers.

To avoid any element of surprise you should always conserve your answers if you suspect even remotely that by continuing beyond a certain point you would damage the case. Prosecutors always stress this point with witnesses, and in giving opacity testimony it is doubly important because of the nature of the evidence presented, and the technical reports supporting this evidence.

Cross examination may be followed by redirect examination, to clarify any questions raised under cross examination. The primary reason for cross examination by defense counsel is to refute your testimony previously given and if possible to

characterize testimony thus given as being untrustworthy or wrong. When an indirect question is asked by the defense you should demand clarification before answering. You should qualify you answer, if the question is not presented completely.

The following question, in various forms, can be expected by you as an opacity witness:

1. Direct Examination

a. General

- (1) What is your name?
- (2) What is your present job? (How long have you had it, etc.)

Various other questions of this type will serve to put you at ease and introduce your qualifications to the court.

b. Specific

- (3) What do you do when you evaluate a source?
- (4) Do you evaluate the emissions before you enter the source?
- (5) Do you inform the source of your evaluation in advance?



- (6) Do you always enter the source?
- (7) Why do you evaluate the emissions from a source before entering?
- (8) Do you have a regularly established procedure you follow?
- (9) What are the procedures followed in Method 9?
- (10) What do you do if you cannot follow procedure (e.g., observer angle to plume)?
- (11) Where do you look at the plume to evaluate it?
- (12) What do you do when you "read" a plume?
- (13) What is "opacity"?
- (14) How does "opacity" differ from Ringlemann?
- (15) Have you seen the Bureau of Mines publication #8333? (The Ringlemann Method).
- (16) How long do you "read" a plume
- (17) Are you usually alone when reading?
- (18) What are the weather conditions on the day specified?

Further questions would deal with specifics of your reporting findings which may have been previously admitted to the courts as evidence.

## 2. Cross Examination

- a. State the exact dates and scores of your certification.
- b. Did you notify this source prior to these evaluations.
- c. Why not?
- d. Does everyone in your office follow the same procedures?
- e. Have you ever made a mistake?
- f. Are photographs taken at the same time as your readings?

Specific questions on various features of your report may be interspersed with reference to various publications, including the Federal Register. You may take notes or file copies with you to the stand to refresh your memory.

Basically, in giving testimony, remember the following four points:

1. Be truthful in your answers.
2. If you do not know, say so.
3. Be responsive to the question, and if you do not understand it, say so.
4. Explain your answer when it is in need of either clarification or qualification.

C. CONCLUSION

Direct evidence is communicated by those having actual knowledge of the facts by means of their senses. Your testimony is regarded as direct evidence if it most certainly exhibits the true state of facts. Your powers of observation as a visible emissions observer are among the primary means available to the prosecutor for providing evidence of opacity violations.

NSPS and SIP opacity regulations vary in their requirements, both in minimum opacity requirements over a period of time, as well as exemptions based on the age of the emission source, type of process, precise location of the emission source, and process malfunctions as described in the particular regulations.

Supplementing your direct testimony is the presentation of exhibits, documents, and demonstrations. This could include your field reports, photographs and other information about the source. Any sketches of the facility which you drew and which were enlarged to a size such that they could easily be shown to a jury from a tripod arrangement may also be useful as possible exhibits. Drawings are especially helpful in that most of the requirements and procedures for visible emission evaluations are based on meteorological and physical characteristics relative to a particular point source. Such parameters as distance to the stack, direction of the wind, position of the observer, relative position of the sun, meteorological conditions, and other relevant visible emission evaluations criteria can be easily, clearly, and concisely illustrated by means of a large scale drawing or sketch.

Relevant books in the field of opacity include the course book for the EPA training course Visible Emissions Certification AP-30 - Optical Properties and Visual Effects of Smoke-Stack Plumes; Method 9 of Part 60 - Visual Determination of the Opacity of Emissions from Stationary Sources; and the Bureau of Mines Circular No. 8333, title Ringlemann Smoke Chart. Any of these sources may be used to show the jury specifications, instructions, and generally accepted methodology of opacity observation. Familiarity with these publications will enhance your credibility as a witness.

## VIII. SUMMARY

The complex nature of many visible emissions does not reduce their compatibility with opacity evaluation techniques. Details stressed in this manual are necessary to fully explain techniques and procedures of successful enforcement of opacity regulations against stationary source of visible emissions.

The elements of case development, chain of custody procedures, and other relevant portions of opacity evaluation techniques have not been included. Guidance on these and other issues is forthcoming. However, following the above visible emission procedures should provide a sound foundation for agency development of a comprehensive, enforceable, visible emissions program for your area.

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#### FOOTNOTES

<sup>1</sup>Response to Remand by U. S. Ct. of Ap., re "Portland Cement Association v. Ruckelshaus", ESED, EPA, RTP, North Carolina 27711. EPA 450/2-74023, November 1974.

<sup>2</sup>Method 9, Visual Determination of the Opacity of Emissions from Stationary Sources, 40 CFR 60, Appendix A.

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EXPERT WITNESSES AND  
ENVIRONMENTAL LITIGATION

J. L. Sullivan and R. J. Roberts  
April 1975

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# EXPERT WITNESSES AND ENVIRONMENTAL LITIGATION

J. L. Sullivan and R. J. Roberts  
The University of Western Ontario

Environmental legislation is developing rapidly. In addition, considerable attention is being given to the environmental impact of new technological developments. Governments as well as citizens, often through organized groups are placing unprecedented pressures on many industries and even on other parts of the government. Popular feeling has been extremely strong on such matters and resistance so far has not been strong. This is likely to change substantially and the future may see a rapid increase in the number of environmental suits especially if the continued existence of certain industries is threatened. Expert evidence will be needed to support government legislation and to support actions to preserve the environment. Such measures will have inevitable economic implications and will evoke predictable responses. Reconciling these viewpoints will provide a challenge for the community which will probably depend to a larger extent on interpretation in courts of law. The ability of various experts to give advice through the legal process will be essential if the most effective compromises are to be found. It is the purpose of this paper to discuss the gathering and use of such scientific evidence in environmental lawsuits.

Environmental legislation is developing rapidly. In addition, considerable attention is being given to the environmental impact of new technological developments. Governments as well as citizens, often through organized groups are placing unprecedented pressures on many industries and even on other parts of the government.

To a great extent, present forms of legislation still remain to be tested and to prove their effectiveness. Authorities on the whole have acted with restraint and where prosecutions

have been launched the causes have been clear. As a result, suits relating to environmental problems have been comparatively few and in many cases have not been vigorously contested. Companies faced with prosecutions by governments for breaches of regulations have often admitted responsibility and received nominal punishment. In many cases, these settlements are private and unrecorded. Because of this dearth of litigation the need for expert technical witnesses has not been felt very strongly and comparatively little experience has been gained in the environmental area.

This situation is likely to change substantially in the future. Aided by what can only be regarded as an astonishing emergence of public awakening, environmental groups have scored major victories. These have, in some cases, had profound financial implications. Stronger government programs in air and water pollution control are also beginning to have more impact and to threaten the future economic well-being of some industries. As these trends continue and as more developmental projects are stopped or delayed by environmental actions there are bound to be more vigorous reactions from industry and other organizations.

The resulting upsurge in litigation will emphasize the need for more technical experts to assist in providing knowledge of the implications from both the environmental and the economic points of view. All kinds of experts will be required. Until recently, it could be almost taken for granted that expert witnesses in environmental litigation would be engineers or chemists. The types of cases which

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occurred were usually related to specific problems. However, in the past few years the question of the environmental impact of such developments as the supersonic transport, new airports, pipelines, power stations, dams, etc., have brought about marked changes. Biologists, ecologists and social scientists have become involved in legal suits often through a sense of commitment concerning the issues in dispute.

## Expert Testimony in Environmental Litigation

### Choice of Technical Expert

(i) *Who may qualify as a technical expert—and how to find him.* Generally, anyone who is "qualified by some special skill, training or experience"<sup>1</sup> can be an expert witness. "(T)he witness must have sufficient skill, knowledge or experience in that field or calling as to make it appear that his opinion or inference will probably aid the trier (of fact) in his search for truth."<sup>2</sup>

It is not essential that the witness be a scholar or specialist in his field. "The knowledge may in some fields be derived from reading alone, in some from practice alone, or as is more commonly the case, from both. While the court may rule that a certain subject of inquiry requires that a member of a given profession, as a doctor, an engineer, or a chemist, be called, usually a specialist in a particular branch within the profession will not be required."<sup>3</sup>

The question whether a person qualifies as an expert in a particular field is a matter for the discretion of the trial judge. For this reason—and also to enhance the credibility of their expert in the eyes of the trier of fact—most environmental lawyers choose to err on the side of over-qualification. They avoid the physicist or engineer who is a member of a concerned citizens' group and wants to volunteer his services. "A fellow who is just a volunteer, who does not have practical experience in the field, may be damaging as a witness because of weakness during cross-examination. He may be vulnerable as to his academic experience in the field, as to his practical experience in the field, or as to his empirical study of the problems at hand."<sup>4</sup>

When finances permit,<sup>5</sup> environmental lawyers will tend to select their technical experts on the basis of "academic credentials (to initially impress the judge or the decision makers), professional experience, and attitudes,"<sup>6</sup> the latter quality referring to the ability of the expert to refrain from coloring his testimony with socio-economic judgments adverse to the lawyer's position such as, "Industry should not have to do this."

Where to find these technical experts? There are many sources. Government agencies such as the Ontario Ministry of the Environment have a number of highly qualified technical experts who are their employees. However, while the government may find these experts useful in its own cases, there may be drawbacks to their usefulness to private litigants. For example, in Ontario it is virtually impossible for a government employed technical expert to testify concerning matters within the scope of his employment. The Ontario Public Service Act<sup>7</sup> provides that every civil servant must take an oath of secrecy that "except as I may be legally required, I will not disclose or give to any person any information or document that comes to my knowledge or possession by reason of my being a civil servant."<sup>8</sup> Similar prohibitions may also restrict the availability of experts who are employees of private industry.

More fertile fields in which to recruit competent expert

witnesses include university faculties, private practitioners consulting engineers, recent retirees from government and industry, and authors of technical books and articles. Many professional and technical societies maintain rosters of their membership by specialty. Societies in Canada maintaining such lists include, *inter alia*, the Chemical Institute of Canada and the professional engineering associations of many provinces.<sup>9</sup>

Finally, it has been suggested that when an environmental lawsuit requires more than one technical expert, it is advisable to "have one expert find another. You need someone whose judgment you can trust, because there are a lot of people, particularly in the air pollution field, who hold themselves out to be experts but who are just terrible at it . . . One precaution, when you find your first good expert, is to give him the job of finding experts in related fields. He can do a much better job by checking professional reputations in the scientific community than you can by looking at a resume."<sup>10</sup>

(ii) *Delineating the field of expertise.* Many environmental lawsuits do require the services of more than one expert witness. They contain a range of technical issues much broader than the range of competence of any one expert. "The man who knows about radioactive emissions may not know about dissemination in the soil or the atmosphere; and those experts who are knowledgeable about dissemination may have no expertise in the health problems raised by the emissions. And so it goes down the line."<sup>11</sup>

As a result, it is necessary carefully to delineate the field of expertise of any one expert before he takes the stand. The opposition can open a sometimes fatal weakness in the environmental lawyer's case if the latter's expert offers an opinion in an area beyond his competence and then is made to look a fool on cross-examination. Karaganis suggests that to avoid this possibility, the lawyer should "(b)ring the experts in for staff conferences, for allocation of research functions, and have them try the case to (the lawyer) and to one another. One of the best methods of finding out the weaknesses in your case is to let a scientist posit his findings before a group of friendly but critical colleagues. Weaknesses will become very evident, and, believe me, pollution cases are not always solidly on the side of the (plaintiff) and against the defendant. The defendant very often has some good arguments."<sup>12</sup>

(iii) *Limiting factors.* Perhaps the most significant limitation on the lawyer in his choice of expert witnesses is finances. It has been said that . . . "(c)ompetent experts will run between four and six hundred dollars a day."<sup>13</sup> and that "(s)everal hundred thousand dollars is not an uncommon expenditure in the development of environmental testimony. Such testimony is little different in terms of the money spent, because of the complexity of the issues involved, from patent litigation. Those . . . who are familiar with the development of experts in patent litigation know how costly it can be . . . We estimate that the cost of expert testimony in our big cases will run between twenty and thirty thousand dollars per case."<sup>14</sup>

If there are no funds from which to pay these large witness fees, the environmental lawyer may be required to fall back on concerned citizens' groups and conservation organizations for technical experts. As Sive points out, "there are numerous experts who are willing to contribute their time without charge because they are dedicated to the cause of conservation. The dedication exists to an inspiring degree among surprisingly large numbers of expert physical

and social scientists and others who are officers, employees, or merely members of major conservation organizations or citizens' groups . . . "15 The lawyer must keep in mind, however, that volunteer experts obtained through these channels may be particularly vulnerable during the cross-examination. To avoid opening weaknesses in his case, the lawyer should take special care to delineate these persons' fields of expertise and stay within those bounds during direct examination.<sup>16</sup>

It is possible that in important cases, some members of university faculties and others might be persuaded to testify without compensation. "Expert testimony in an important environmental litigation is a mark of prestige in almost anyone's curriculum vitae . . . It is no derogation of the nobility and selflessness of those who have given many whole days and weeks, with no or ridiculously small compensation, to point out that such recognition may be helpful to the expert witnesses in intangible ways."<sup>17</sup>

#### Functions of the Technical Expert

(i) *Pre-trial.* In complex environmental litigation, the technical expert can fulfill a variety of important functions at the pre-trial stage. For this reason, the wise lawyer will retain his technical experts as far as possible in advance of the actual trial.

First, having his experts available early in the proceeding gives the lawyer a chance to make effective discovery against the polluter. The lawyer can be educated by the expert about the details necessary to make discovery effective, such as the nature and history of the industry involved; the technology available to correct the pollution problem; efforts, if any, by the industry to alleviate such pollution; the physical and chemical nature of the pollutants; the potential sources of the pollution within the offending plant; and the short and long-term biological effects of the pollutants. If the experts are not available to assist in discovery, important areas of investigation may be foreclosed.

Second, the expert brought in at the pre-trial stage of the litigation also has time to marshal hard evidence that may prove indispensable at trial, analyze the data already collected, and make recommendations for additional research or testing which might buttress the case against the polluter. The importance to courts of such hard evidence is highlighted in *Bortz Coal Company vs. Air Pollution Commission, Commonwealth of Pennsylvania*.<sup>18</sup> In that case, the air pollution commission issued an abatement order which, in effect, required the coal company's coke ovens to shut down. The coal company took the Commission to court. In court, the Commission presented as its chief witness one of its own air pollution control engineers. In the words of the court:

*This engineering witness testified, in addition to his qualifications, to a visit to the scene of Bortz's coke ovens . . . and to his observations concerning the emission of smoke from the operation of Bortz's coke ovens . . . From his observations, he testified that the smoke emissions were in excess of the permissible allowance of smoke as established by the Commission's regulation utilizing the Ringelmann Smoke Chart . . .*<sup>19</sup>

Those observations were rejected because the Commission's expert did not have any hard evidence to back them up. The court said:

*The problem arises in that this witness, although ad-*

*mittedly an expert, for the purposes of this record, did not make any stack tests, nor did he utilize any of the available instrumentation to measure the amount of falling particulate, emitting particulate, or smoke density . . . The Commonwealth here, in effect, is ordering the shutdown of Bortz's coke ovens. This is no small matter. To permit the Commission to order an abatement based solely upon the visual tests strikes at the heart of fairness . . .*<sup>20</sup>

Third, the sooner the expert is able to impart to the lawyer a thorough understanding of the problems in the case the more successful the lawyer is likely to be in formulating and developing an effective trial strategy to implement in the courtroom. A thorough understanding of the technological problems involved can be invaluable to the lawyer in deciding what hard evidence to present, who should be his witnesses, the questions to ask and how far he should go in cross-examining the witnesses for the other side. On this score, it has been pointed out that in environmental litigation it is necessary "that the attorney be as expert as, or more expert than the expert."

Lastly, the expert must sit down with the lawyer in a pre-trial conference and carefully prepare his own direct testimony. The lawyer will "try to have the expert well-prepared to present his subtle theories in as articulate and as concrete language as possible. The more vague and ethereal such testimony is, the more likely it is that the opposition's attempts at derision will be complemented and thus furthered, by the general psychological effect the witness has on the court."<sup>21</sup>

This is also the point at which "clashes of temperaments and techniques"<sup>22</sup> are resolved. "Such a conference acquaints both lawyer and witness with their respective methods of presentation, the issues considered crucial and the questions to be asked—in short a complete rapport resulting in a smooth convincing presentation."<sup>23</sup>

(ii) *Trial.* At trial, the technical expert has two principal functions:

To give testimony interpreting the meaning of technological evidence for the benefit of the fact-finder, i.e., the judge or jury, and

To give technical advice to the trial lawyer, particularly during cross-examination of the other side's experts.

By far the more important function is the first. The outcome of an entire environmental lawsuit may depend on the efficacy of such testimony. If the lawyer does not perceive the necessity for expert testimony on a particular issue or the pitfalls associated with using technical experts in such areas, the result could be disaster for his client.

Essentially, the subject matter to which expert testimony might be directed can be broken down into the following broad categories: (a) Causal connection; (b) Pollution control technology; (c) Breach of emission standards; (d) Injury; and, (e) Damages.

Each of these categories raises its own special set of problems which may dictate the use of an expert, as will be seen in the following text.

#### Causal Connection

In many environmental lawsuits, one of the most difficult matters to prove is that the defendant caused the injury. "Numerous scientific and technical problems arise in attempts to link activities of a given defendant allegedly causing pollution with plaintiff's claimed injury from that

pollution."<sup>24</sup> These problems can arise in a variety of contexts, for example, showing that air, water or noise pollution from the defendant's operation and not the operations of his neighbors caused the injury; showing that an oil slick which damaged beaches or property came from a particular ship; or showing that health problems resulted from the defendant's pollution and not from disease. In such circumstances the technical expert may prove invaluable in either fingering or exculpating the defendant as the responsible party.

For example, in *Russell Transport Ltd. vs. Ontario Malleable Iron*,<sup>25</sup> technical experts used carefully gathered and documented evidence to prove that pollutants emitted into the air from the defendant's foundry operation caused the plaintiff's injury. The plaintiff corporation operated a new car storage yard adjacent to this foundry. A short while after commencing operations at this location, it came to the plaintiff's attention that the paint on a number of cars in the yard was becoming pitted and corroded. When a chemist inspected the damage on some of these cars, he found particles which were determined through microscopic examination to be "red iron rust, black iron scale, white cast iron, chilled cast iron, grey cast iron or malleable pearl cast iron particles, some of which were spherical in form, and manganese sulphide crystal, . . . particles incident to foundry operations."<sup>26</sup> To show conclusively that these particles came from defendant's foundry, special panels of steel painted in the same way as the cars<sup>27</sup> were exposed in various parts of the plaintiff's premises. After forty-six days the panels were examined and showed marked pitting. It was found that "(t)he plates which were exposed in areas on the plaintiff's property more remote from the defendant's plant show that the surface was affected to a lesser degree."<sup>28</sup>

Causation difficulties requiring the assistance of experts also have arisen in disputes over oil spills. For example, in *United States vs. Tanker Monsoon*,<sup>29</sup> the evidence of an expert witness showed conclusively that the *Monsoon* did not cause an oil spill that fouled a part of the Piscataqua River in New Hampshire, despite substantial circumstantial evidence indicating responsibility. The Coast Guard received a complaint of an oil spill in the river just as the *Monsoon* was finishing discharging a cargo of No. 6 Bunker Oil at a terminal in the same vicinity. There were no traces of oil around the *Monsoon's* hull or the pier, but she was the only tanker at any of the terminals and the spillage was No. 6 oil. On this basis, the *Monsoon* was charged by the Coast Guard with a violation of the Oil Pollution Act<sup>30</sup> and required to post a \$10,000 bond and arrange for the clean-up of the pollution at her own expense before being permitted to set sail. At trial, chemical analysis of an expert "showed conclusively . . . that although the oil spillage was No. 6 oil, it was special Navy oil, an irony which was not pursued—and not the commercial grade carried by the *Monsoon*."

The testimony of experts on the issue of causation can become crucial in dealing with suspected injuries to health from environmental hazards which are sophisticated and not easily traced. There has been recent experience with this in Toronto in connection with high-lead blood levels, a condition which causes brain damage in children. In *Canada Metal Company Ltd. vs. MacFarlane*,<sup>31</sup> the Ontario Ministry of the Environment issued two stop orders essentially shutting down the plants of the Canada Metal Company and Roto-Cast Limited. "The stop orders were issued immediately after data showing some high-lead blood levels in persons residing near the Canada Metal plant had

been received by the Air Management Branch from the City of Toronto's Medical Officer of Health."<sup>32</sup> However, the stop orders were quashed by the Supreme Court of Ontario after Dr. Henrietta Sax, a lead expert retained by the defendants testified on the companies' behalf. The Ministry of the Environment did not present any expert testimony in rebuttal, choosing to rely upon an affidavit of the Director of the Air Management Branch citing a staff engineer's report "that soil, vegetation and ambient air quality surveys in the vicinity of the Canada Metal Company plant had shown levels of lead considerably in excess of those found in normal urban environments."<sup>33</sup> The court dismissed this report, saying, "What possible evidentiary value is there in the words 'considerably in excess of those found in the normal urban environment'? There was no evidence as to what the lead levels were in a normal environment, let alone what the deponent in his own mind regarded as a normal urban environment. To say that lead levels in the soil, vegetation and ambient air in the vicinity of the Canada Metal Plant were in excess . . . of those found in a normal urban environment, whatever that means, was absolutely worthless."<sup>34</sup> The court also rejected as unsubstantial, evidence cited in the affidavit of blood tests taken by Dr. Gordon Stopps, Senior Consultant, Environmental Health, for the Ontario Ministry of Health. "(T)he court laid great emphasis on the fact that, of 725 persons tested, 722 were in effect found not to have unsafe blood lead levels. In other words, on the basis of the affidavit, 99.6% of those tested living in the vicinity of the plant showed no unsafe blood lead levels. Even the reasons for high lead level content in the three persons were attributable, in some cases, to other causes."

#### Pollution Control Technology

It is not unusual for expert witnesses to be called upon to testify whether there is technology available which is capable of averting the pollution problem in question. Such testimony can make or break a case such as a nuisance action, where the relief sought is an injunction against emitting the offending pollutant. In the absence of technology capable of controlling the pollution an injunction might result in closing down the plant and throwing large numbers of people out of work—a prospect some courts find unthinkable. The problem as it exists in many courts in the U.S. was put this way:

*(The prosecutor) must also show that technology exists capable of curing the problem, because whatever the vogue may become with regard to shutting down polluting industries, courts today are extremely reluctant to enjoin major economic activities. I am currently dealing with one industry in Illinois which employs eleven thousand people. There is not much dispute about the fact that they are causing serious environmental degradation. We demonstrated this to the court, and the court simply said to us, "If you think I'm crazy enough to put eleven thousand workers out of work, you're sadly mistaken." . . . The role of the public prosecutor, however, is to do everything possible to eliminate the emission source. Thus, in terms of proof, the big problem is not proving the pollution but showing that technology exists to deal with it. In every case in which I have been involved, that is the first question the judge has asked*

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The question whether technology exists which is capable of curing the pollution problem is also important to Canadian courts, though perhaps to a lesser extent than in the

U.S. Before issuing a preliminary injunction, i.e., a temporary injunction against emitting the offending pollutants, Canadian courts follow the traditional American approach of "balancing the equities," a process which necessarily involves consideration of the overall social and economic effects of such action. Some Canadian courts have applied the same principles in determining whether to issue a permanent injunction. The importance that these courts attach to knowing whether there is technology available capable of alleviating the pollution problem is illustrated in the opinion of MacDonnell, J. A., in *Bottom vs. Ontario Leaf Tobacco*, where he stated:

*The defendant's factory, employing it is said some two hundred men, has been equipped with every known device for preventing the escape of fumes and smells; it is impossible to avoid the discomfort caused to the plaintiff without stopping the operation of the factory altogether; to grant an injunction prohibiting the present nuisance would mean the closing of the plant, resulting not merely in loss to the defendant but in unemployment disastrous to a small community. . . .*<sup>36</sup>

The court substituted money damages for the injunction.

On the other hand, there have been Canadian cases issuing permanent injunctions against pollution by large industrial operations without even considering whether technology exists capable of alleviating the problem. A classic example is the case of *McKie vs. The K.V.P. Co. Ltd.*,<sup>37</sup> where the court, with no idea whether technology capable of curing the pollution problem was available, permanently enjoined a kraft paper mill in the Town of Espanola "from depositing foreign substances or matter in the Spanish river which alter the character or quality of the water flowing over the lands of the plaintiff."<sup>38</sup> In so doing, the court apparently followed the English tradition in granting permanent injunctive relief which eschews as a function of the legislature and not the judiciary consideration of the question whether the exercise of the rights of the plaintiff should be subjugated to the economic interests of the defendant or the community. Several other Canadian cases have taken the same tack.

A noted Canadian authority suggests that this apparent conflict in the approach of Canadian courts towards issuing permanent injunctions is tending to resolve itself in favour of the English tradition.<sup>39</sup> But even if this prediction proves to be correct, Canadian courts cannot help but be influenced by the potential economic impact of decisions affecting major industries. It appears that for this reason alone, the expert witness will continue to be called upon to testify whether technology exists capable of curing the pollution problem under examination.

#### Breach of Emission Standards

One of the least complex issues calling for the evidence of a technical expert is the question whether a statutory emission standard or regulation has been breached. The issue is usually cut-and-dried—was the level of the pollutant greater than that prescribed in the standard? The services of an expert are required because many pollutants cannot be detected and measured without sophisticated equipment and techniques.

For example, in air pollution cases it is often necessary to undertake stack sampling, a complex technique for determining what pollutants are emitted into the air. An access, usually an outside ladder, must be erected along the side of the smoke stack. Then an opening of approximately 14 in.

in diameter must be made into the walls of the stack in order to insert the probe. Once the smoke is collected it must be analyzed in a laboratory to determine if any statutory limitations have been exceeded. If the plaintiff does not have access to the stack, he may undertake a complex testing program using elaborate equipment at the receiving end of the pollution. This is what took place in the *Russell Transport* case,<sup>40</sup> where an analysis of the dust deposits at the receiving end proved that the defendant was responsible for the damage.

Some tests which appear relatively simple to perform create many problems when a layman attempts to present the results as evidence. One of these deceptively simple tests involves the measurement of smoke density using a Ringelmann Chart. The chart comprises a number of shaded squares which represent various densities of smoke. The instructions inform the operator that he must stand with the sun at his back, hold the chart at arm's length and match the shaded area with the smoke emerging from the stack. Recently, it has been suggested that any citizen using the smoke density chart may give evidence at trial.<sup>41</sup> However, to be sure of having this evidence given its full weight, it is advisable to have an expert conduct the test. "Convictions are difficult to obtain because of the notorious inaccuracy of the Ringelmann opacity test. Light conditions, position of the observer, and diameter of the emission stack are factors which can be raised to cast substantial doubt upon the validity of the test. The (plaintiff) must be extremely careful to properly prove that the particular testing device employed is the one referred to in the legislation."<sup>42</sup>

Beyond the practical reasons for having an expert testify there may also be legislative restrictions on who may present evidence. For instance, under Regulation 15 of the Ontario Air Pollution Control Act<sup>43</sup> only a provincial officer may rely upon the smoke density chart to enforce the Act.<sup>44</sup> Similar restrictions exist in some states of the U.S. One such restriction, a practice of the Colorado State Department of Health restricting the certification of experts in the use of Ringelmann opacity readings to employees of the State, was recently struck down by the Colorado District Court.<sup>45</sup>

#### Injury

The fact of injury is not always obvious and expert testimony might be required to prove that injury did occur. Medical experts often are called to testify on this issue when the activity of the defendant is alleged to be a health hazard. The difficulty with respect to injury to health is that the precise harm from exposure to a pollutant, even in quantities exceeding established limits, might not be detectable or might masquerade as another ailment.

A good example of how medical experts can be used conclusively to prove injury from the pollution of the defendant occurred in *Maryland vs. Galaxy Chemical Co. Ltd.*<sup>46</sup> In that case, Galaxy Chemical was emitting into the surrounding atmosphere benzene, methylene chloride and methyl ethyl ketone fumes. These fumes had little odor and were substantially undetectable in the surrounding area without scientific instruments. A number of persons residing in this area complained of headache, nausea, drowsiness, and abdominal pain. However, the majority of persons in the neighborhood, some of whom lived next door to the plant, had no such complaints. If this were the only evidence of injury offered at trial, the action of the State of Maryland would have failed. The court would have con-

cluded that there was no injury, that the complaints of the neighbors were the result of suggestion or attributable to causes other than the fumes from the plant.

The state clinched its case with testimony from medical experts which not only linked the ailments complained of by the neighbors with the fumes from the plant but also suggested that the absence of symptoms in others did not mean that they were unaffected. Three different medical doctors testified that they had examined a number of the complaining neighbors and their laboratory tests confirmed that these people were suffering from pancreatitis, an ailment that can damage the pancreas and lead to diabetes. One of these experts testified that "(i)t was her opinion that the operations of Galaxy Chemical Company were adversely affecting the health of the Valley residents. This opinion was based on several being sick at the same time in the nature of an epidemic and the laboratory abnormalities when present in the Valley which upon leaving became normal again as the patient felt better and improved generally."<sup>47</sup> Each of these experts also testified, in effect, that "(o)ne can have pancreatitis without symptoms and without knowledge". The State was able to extract a similar statement from Dr. Goldstein, a medical expert called on behalf of Galaxy. On the basis of this evidence, the court found:

*(T)hat the present method of operation of Galaxy Chemical Company constitutes a nuisance. . . . Without concluding positively that the present method of operation is a hazard to health, the Court concludes that it may be a hazard to health. . . .*<sup>48</sup>

The Court enjoined the company "from emitting into the air beyond its property lines, gases, vapours, odors, which are or may be predicted by reasonable certainty to be injurious to human, plant or animal life or property. . . ."<sup>49</sup>

The chances of success on the issue of injury to health appear to be considerably reduced when medical experts are in doubt as to the specific injury caused by a pollutant, even though it is generally accepted that excessive exposure to the pollutant is unhealthy. This lesson was learned by the plaintiffs in *Allyn vs. United States*,<sup>50</sup> where the plaintiffs were denied relief, even though they had proven that they had unusually high carbon monoxide loadings in their blood resulting from repeated exposure to atmospheric carbon monoxide levels exceeding the limit regarded as acceptable by the American Conference of Governmental Industrial Hygienists.<sup>51</sup> The court rejected the claim of the plaintiffs, stating:

*The Medical experts who testified for the plaintiffs and for the defendant . . . were in agreement that, in the light of the present state of medical knowledge, it cannot be stated positively that carboxyhemoglobin percentages within the range of those reflected by the present record will have a harmful effect on the persons involved, irrespective of whether such persons are non-smokers or smokers. The plaintiffs' expert would merely say that, as to non-smokers, there is a possibility that toxic effects occurred from the levels of carboxyhemoglobin that were reached in the non-smokers . . . He was not prepared to go even this far with respect to the possibility of harmful effects on the smokers. As previously stated, the plaintiff Hurt is a heavy smoker . . .*<sup>52</sup>

The Court concluded "that the plaintiff Hurt has failed to prove that his duties . . . have caused him to be 'exposed to dangerously high concentration of carbon monoxide,' which 'are likely to cause serious disease or fatality'."<sup>53</sup>

## Damages

Where money damages are claimed, it is necessary for the court to calculate in terms of cash the extent of the loss suffered by the plaintiff and it is not uncommon for expert witnesses to be called upon by the parties to assist the court in this task. For example, medical experts might be requested to estimate the degree of physical impairment, etc., resulting from a toxic dose of a pollutant.<sup>54</sup> Or real estate experts might be called upon to estimate the drop in market value of property which has deteriorated either physically or aesthetically at the hands of the defendant.<sup>55</sup>

It is important to distinguish the question of damages from the question of injury. Sometimes, the failure of a lawyer or expert to separate these issues in his own mind can affect the witness' credibility resulting in harm to the lawyer's case. This is particularly true in cases where injury itself is in dispute—there is no loss to measure in terms of cash if there is no injury. For example, in *Kamo Electric Cooperative Ltd. vs. Cushman*,<sup>56</sup> an expert witness who apparently failed to distinguish damages from injury testified at one point that "(h)e did not think the value of any real estate is ever affected by the appearance of power lines." At the same time, he "put the before and the after values (of the farm affected by the power lines) at \$51,700 and \$50,150 total damage of \$1,550." Needless to say, the electric cooperative that called him as its expert witness lost the case.

## Advisory Function.

The usefulness of a technical expert at trial is not confined to giving testimony. The technical expert is also useful as an advisor to the lawyer throughout the course of the trial. Having his expert "on call for momentary advice on technical points . . . particularly when examining the opposing expert"<sup>57</sup> can be a boon to the lawyer faced with unanticipated evidence or a response he doesn't quite understand.

Also, keeping the technical expert on hand throughout the trial facilitates communication between the lawyer and expert so that at the end of the trial day, they can quickly "recap the events of the day, discussing ways to strengthen the weak areas and capitalize on the strong points thus far developed."<sup>58</sup>

Moreover, the technical expert who is available to observe all of the proceedings at trial prior to taking the stand will often be able to present his evidence more effectively. This is usually the case when the opposing experts testify first. The technical expert then has an opportunity to understand the techniques used by the other side for complex measurements such as calculation of optimum chimney height. Technical witnesses who take the stand without understanding the techniques used by the other side may well give testimony which will serve only to confuse the court and unjustifiably cause them to appear incompetent.<sup>59</sup>

## Credibility and Flaws in Expert Testimony

The testimony of a technical expert is worthless if it is not believed, and, in general, most courts are inclined to be skeptical of expert opinion. As a result, the credibility of the expert becomes a major issue in almost every case. The lawyer for the other side can be expected to prod on cross-examination every aspect of the technical expert's presentation.<sup>60</sup> If he finds a flaw he will relentlessly pursue it in

an attempt to hurt irreparably the cause of the side that called the expert. Such flaws are commonly found:

In the manner in which the expert presents his testimony;

In the use by the expert of dubious testing equipment or procedures; or,

In a conflict between the testimony of the expert being examined and the testimony of another expert.

Some experts have been so emotionally wrenched by such attacks that they are paranoid about taking the stand again. This need not happen; the credibility issue may not be a stumbling block to success if the lawyer and his expert properly prepare before the latter takes the stand.

It is no secret that generally courts do not trust the opinion of technical experts. This bias is aptly illustrated in cases where courts have been confronted with conflicts between the scientific evidence of experts and the practical evidence of lay witnesses. For example, in *Southern Canada Power Co. Ltd. vs. The King*,<sup>61</sup> the Supreme Court approved a lower court judgment in which lay testimony of residents in the area as to the cause of a rush of water and ice that washed out a railway embankment was accepted over conflicting expert testimony as to causation. Mr. Justice Davis stated in his opinion that it could be appreciated if the trial judge has disregarded the expert opinion and relied solely upon the testimony of the lay witnesses. Similarly, in *Canadian Copper Co. vs. Lindala*,<sup>62</sup> the Ontario Court of Appeals affirmed a trial court opinion preferring the testimony of eye witnesses that crop damage resulted from sulfur fumes from the defendant's plant over the testimony of technical experts that the damage resulted from disease and not the sulfur fumes.

In cases where both sides present expert evidence, this natural bias against trusting expert opinion can crystallize into complete rejection of the opinion of one side's expert if there are flaws to be found in his presentation. Even the expert's looks, mannerisms, and speech are important. They may be attacked if the other side believes that they fail to convey an image of competence and sincerity. As Sive points out, "(o)ne of the most significant . . . problems involves the degree to which opposing counsel will attempt to portray the witness as a composite of several objects of derision, among which are the feminized male, the unworldly sentimentalist, the professor who has never met a payroll, the enemy of the poor who need more kilowatts and hard goods, and the intellectual snob."<sup>63</sup>

The expert's attitude on the stand may also destroy the impact of his testimony. If he appears to be arrogant or argumentative, he risks having his testimony discounted altogether. An example of the harm assuming such a stance can do occurred in *McKie vs. The K.V.P. Company Ltd.*<sup>64</sup> In that case, Mr. Justice McRuer, complaining that some of the expert witnesses called for the defendant found it difficult to distinguish between the function of a witness and those of an advocate, rejected outright these witnesses' scientific evidence. He took refuge in the opinion of Sir G. J. Turner, L.J. in *Goldsmith vs. The Tunnbridge Wells Improvement Commissioners*<sup>65</sup> which stated, in effect, that with all due respect to scientific gentlemen their scientific examination must have depended much on the state of circumstances which existed at the times of investigation, the force of the stream, the state of the weather, etc. On this basis, he concluded that these experts' scientific evidence was secondary to other evidence as to the facts.

The credibility of a technical expert may also be undermined on cross-examination if the other side can force him

to admit that there might have been a defect in his testing procedure or equipment. A good example of this occurred in *Nelson vs. C. & C. Plywood Corporation*,<sup>66</sup> a nuisance action in which the plaintiffs claimed that their well had been poisoned by phenols deposited in the groundwater at the defendant's plant. "(T)he defendant had an engineer testify as to the direction of flow of the groundwater and his conclusion was that the direction was away from the Nelson well." However, the court discounted this testimony when the other side brought out on cross-examination "that the tests he had made were at high-water time." Another expert for the defendant, a chemist, "testified that the phenols found in the Nelson well were not the same phenols deposited by (the defendant)." His testimony was likewise discounted when opposing counsel brought out on cross-examination that "there could have been chemical reaction with other minerals and chemicals in the ground so that the phenols in the well may have a different chemical composition than when deposited (by the defendant)."<sup>67</sup>

Credibility problems commonly crop up when there is a conflict in testimony given by different experts. This can happen quite inadvertently, as when different technical experts are called to give evidence on optimum chimney height. Even in simple cases involving flat terrain the available methods of calculation of chimney heights based on numerous theoretical predictions and empirical observations are very doubtful. Two experts could arrive at such divergent values as to confuse hopelessly a court attempting to resolve, for example, a difference on a specific height between a government authority and an industry. Where the topography of the site is not flat or where the many other possible complicating factors exist the problem is still more confusing. The experts on both sides of a case may be able to feel that they are presenting the truth and will argue in favour of assumptions which suit their purpose.<sup>68</sup> Experiences in court giving evidence on atmospheric diffusion and the calculation of chimney heights are bound to evoke unpleasant memories in any technical witness who has been concerned in them.

The key to avoiding all of these stumbling blocks is preparation and attention to detail. Before he takes the stand, the expert should take pains not to look *seedy* or *radical*. "Experience has shown that a conservative image is most impressive to the jury, instilling the idea that your expert is a man of great sincerity, competence and integrity. His appearance will be restrained, sans long hair, beard, mod dress and wire rims. His deportment will be quiet, yet self-assured, courteous and poised. . . . His diction should be articulate and understandable to the farthest juror without the aid of a public address system . . ."<sup>69</sup>

The expert should be reminded "to answer simply and truthfully, not to argue, not to regard cross-examination as a game of wits, not to attempt to figure out whether an answer will be helpful or harmful, and to leave strategy and tactics to the lawyers."<sup>70</sup>

The testimony of the expert should be cast, as far as is possible, in lay language and should proceed in a logical fashion readily understandable to laymen. "The jury will remember little, if any, of testimony given in highly technical jargon."

"It is important that, while obtaining from an expert his opinion, he also states his reason for it. If part of those reasons is based on an exhibit you should have that exhibit identified at the time, as an expert is unlikely to be testifying again in the Court of Appeal."

"It is important that continuous reference be made to



the empirical tests, investigations, etc. carried out by your witnesses, for such data will have more impression on the jury . . . ."

As to the tests performed by the expert, care must be taken that they are carried out in an impeccable fashion with reliable equipment. The expert should have on hand detailed accounts of the conditions under which each test was performed, e.g., temperature, wind velocity, atmospheric conditions, etc. In addition, the expert should be present, if possible, throughout the trial in order to be better equipped to explain any apparent contradictions between his own testimony and that of other experts giving evidence in the same proceeding.

## Conclusion

Environmental litigation is about to mushroom—and with it, the number of scientists entering the court room as expert witnesses. "The social-values and social-conflicts questions, resulting from the 'good guys versus the bad guys' issues, will increasingly give way to factual issues in which the scientists' participation becomes more and more important."<sup>72</sup> More than ever before, lawyer and scientist will be melding their talents to produce hopefully convincing presentations to put before the courts. Their success in meeting this challenge will depend on how well both understand the role of the technical expert in environmental cases.

## References

1. *Rex v. German*, (1947), Ontario Reports 395, (1947), 4 Dominion Law Reports 69.
2. McCormick on Evidence, at 30 (2nd. ed. 1972).
3. *Idem*, See *Rice v. Sockett*, (1913), 27 Ontario Law Reports 410, 8 Dominion Law Reports 84 (H.C.), where the court stated that not only a consulting engineer but also persons engaged in cement construction and concrete work were to be classed as experts. See also, *Re Winnipeg Golf Club*, (1928), 3 Dominion Law Reports 522 (Man. C.A.); *Marchyshyn v. Fane Auto Works Limited*, (1932), 4 Dominion Law Reports 618 (Alta. C.A.) Regarding the absence of necessity for a specialist in a particular branch within the profession, see *McCaugherty v. Gutta Percha & Rubber Co.* (1903), 2 Ontario Weekly Reports 204 (C.A.).
4. Karaganis, *Public Suits: The Search for Evidence*, in Hassett, *Environmental Law* at 56 (Institute of Continuing Legal Education, University of Michigan, 1971).
5. See later text and accompanying footnotes.
6. Karaganis at 57; Klein suggests that "(i)n establishing your experts' credibility, it has been found valuable if a general outline is followed which lists systematically such items as name, residence, occupation, place of work, education, chronological experience, licenses, professional affiliations, authorships, lectures, etc. The expert will respond best if given sufficient latitude to expand each topic in a terse but narrative style, elaborating as necessary, to cover the facts completely and authentically, with emphasis to suit the case requirements." Klein, *Making the Most of Your Expert*, 46 Conn. B.J. 483, 491, (1972).
7. Revised Statutes of Ontario 1970, c. 386.
8. *Idem*, Section 10(1); certainly, a government-employed technical expert may be subpoenaed by the court and required to give opinion evidence concerning matters within the scope of his employment, even though he is directed by his agency to refuse to testify. *Re Diamond and the Ontario Municipal Board*, (1962), Ontario Reports 328, (C.A.). However, his information normally will not be available until trial—a severe drawback to adequate preparation and presentation of the case.
9. Technical societies in the United States which may be sources of expert witnesses include the "ASME, ASCE, ASTM, ASM, ASSE, . . . as well as the professional societies, including NSPE, CEC, AICE, AIA, . . . . Institutes include such organizations as NSC, AISC, ANSI. Members of their respective Code Committees are an excellent source of expertise." S. J. Klein, *Making the Most of Your Expert*, 46 Conn. B.J. 483, 485 (1972).
10. Karaganis, *Public Suits: The Search for Evidence*, Reference 4, at 58-59. Hadden suggests that "(t)here are many sources of technological information which a lawyer should read in order to be able to talk to his experts and cross-examine the defendants intelligently. For example, local Tuberculosis and Respiratory Disease Association offices can be very helpful in supplying technical articles or suggesting where they can be found. The United States Department of Health, Education and Welfare publishes long lists of abstracts which may provide useful information, and the local pollution control agency may be useful . . . ." D. Hadden, *Private Damage Suits*, in C. Hassett, *Environmental Law* at 43-44 (Inst. Cont. Leg. Ed. Ann Arbor 1971).
11. Joseph L. Sax, *New Direction in the Law*, in Hassett, *Environmental Law*, at 6-7, (Inst. Cont. Leg. Ed., Ann Arbor, Mich. 1971).
12. Karaganis, *Public Suits: The Search for Evidence*, Reference 4, at 59.
13. Karaganis, *Public Suits: The Search for Evidence*, Reference 4, at 60. Sive estimates the range to be "from three hundred to seven hundred fifty dollars per day plus expenses." D. Sive, *Securing, Examining, and Cross-Examining Expert Witnesses in Environmental Cases*, 68 Mich. Law Rev. 1175, at 1180.
14. Karaganis, Reference 4, at 57-60.
15. Sive, Reference 13, at 1180.
16. See later text.
17. Sive, at 1180.
18. 279 A. 2d 388 (Pa. Cmwlth, 1971).
19. *Idem*, at 397.
20. *Idem*, at 398.
21. Sive, *Securing, Examining, and Cross-Examining Expert Witnesses in Environmental Cases*, at 1191, Michigan Law Review (1970).
22. *Idem*, Such clashes may be common, resulting from an unfortunate lack of communication between the scientific and legal communities. A survey of the legal community conducted by the Oak Ridge National Laboratory in 1971 highlighted the gap between law and science. "Many respondents perceived scientists and engineers to be narrow in their social outlook and provincial in their approach to problems:  
Scientists tend to specialize in professional subareas and the positions they advocate fail to recognize the broader general implications.  
Most scientists remain academicians, aloof from the community.  
Scientists . . . tend to measure human responses by slide rules  
. . . their political notions are absurd.  
"The veracity and objectivity of scientists and engineers were questioned by a large proportion of the respondents:  
Scientists are often arbitrary about matters, believing that they have the only set answers . . . (t)he information is inaccurate, based on individual opinion rather than fact.  
Scientists' attitudes are influenced by the propensities of their employers.  
Scientists are too dogmatic, visionary and impractical in their discussion of ecological problems . . . (those) who are environmentalists are too emotional to provide the practical ideas needed.  
Scientists tend to extend their expertise in environmental matters into areas of politics and society which are beyond their competence. . . ."  
J. Curlin, *Law, Science, and Public Policy: A Problem in Communication*, in W. Thomas, *Scientists in the Legal System*, at 40-41, (Ann Arbor Science Pub. 1974).
23. A. Maloney, Q.C., *Expert Evidence in Defending a Criminal Case*, at 94, (Law Soc. of Upper Canada Special Lecture Series 1969).
24. J. MacDonald & J. Conway, *Environmental Litigation*, at 251 (University of Wisconsin 1972).
25. (1952) 4 Dom. L.R. 721 (Ont. H.C.)
26. *Idem*, at 723.
27. These panels were furnished by General Motors of Canada, the manufacturer of the new cars stored on the plaintiff's premises.
28. (1952) 4 Dom. L.R. at 726. This evidence might have been improved, for example, by comparing the quantitative rates of deposition on the plaintiff's property with locations in the same general area but more remote from the foundry. As a rule, such emissions are relatively coarse and tend to settle



- within a distance of a few hundred feet of the cupola. This may have forestalled a possible defence that the plaintiffs were also near to the Canadian Pacific Railroad. Emissions from steam locomotives often contain large particles which can be corrosive. This was mentioned in the proceeding but the defendant did not effectively press this point as an alternative explanation for the damage. One technical witness called by the defendant was obviously ineffectual. He apparently did not satisfy the court that he was sufficiently familiar with the instrument for measuring sulfur dioxide and moreover kept no proper record of wind direction.
29. Environmental Reporter 1707, Vol. 1, No. 7651 (1st Cir. Oct. 23, 1970).
  30. United St. Code, Vol. 3, Section 431-437.
  31. (1974) Ont. R. 577.
  32. II Canadian Environmental Law News 161 (1973).
  33. *Idem*, at 164.
  34. *Idem*, at 164.
  35. Karaganis, *Public Suits: The Search for Evidence*, *supra*, n. 10, at 50-51.
  36. (1935) Ont. R. 205 (C.A.), (1935) 2 Dom. L.R. 699. See also *Canada Paper Co. v. Brown* (1922), 63 Sup. Court Rep. 243, 66 Dom. L.R. 287; *Belisle v. Canadian Cottons Ltd.*, (1952) Ont. Weekly Notes 114 (H.C.), (1947) 2 Dom. L.R. 840; *Chadwick v. Toronto* (1914), 32 Ont. L.R. 111 (H.C.), *aff'd* by C.A., 32 Ont. L.R. 115, *Ramsay v. Barnes* (1913), 5 Ont. Wkly Notes 322.
  37. (1948) 3 Dom. L.R. 201 (Ont. H.C.), *aff'd* by S.C.C. (1949) S.C.R. 698.
  38. *Idem*, at 219. However the court's action did not have as much dash as the quoted passage at first blush might indicate. The court suspended the injunction for six months "in order to give the defendant an opportunity to provide other means of disposal of its noxious effluent." *Idem*, at 220. Later, the Parliament of Ontario issued a special act permitting K.V.P. to continue operating.
  39. McLaren, *The Common Law Nuisance Actions and the Environmental Battle—Well-Tempered Swords or Bruken Reeds?* 10 Osgoode Hall L.J. 505, 552-556 (1972).
  40. *Russell Transport v. Ontario Malleable Iron Co. Ltd.*, Ref. 26.
  41. D. Estrin & J. Swaigen, *Environment on Trial*, (New Press 1974).
  42. A. Lucas, *The Role of the Public*, 6 University of British Columbia Law Review (1971).
  43. Revised Regulations of Ontario 1970 Reg. 15, Sec. 7, Sub-Section 3.
  44. Some suggest that this regulation may be invalid "as there is nothing in the (Environmental Protection Act) itself to authorize a regulation restricting the common law right of a citizen to testify on such an everyday occurrence." *Environment on Trial*, Ref. 42.
  45. *Western Alfalfa Corp. v. Air Pollution Variance Board of the State of Colorado*, 3 Environment Reporter-Cases 1399, (Col. D. Ct. 1971).
  46. 1 Env. Reporter-Cases 1661 (Md. Cir. Ct. 1970) *permanent injunction entered*. 2 Env. Reporter-Cases 1199, (Md. Cir. Ct. 1971).
  47. *Idem*, at 1662.
  48. *Idem*, at 1666.
  49. *Idem*, at 1668.
  50. 461 Federal Reporter, 2nd Series, 810 (Ct. Cl. 1972).
  51. That level is 50 parts of carbon monoxide per million. It was noted in *Maryland v. Galaxy Chemical Co. Ltd.*, that "in Washington, D.C., for the general population they have adopted a figure of 20 parts per million of carbon dioxide." *Id.* at 1662.
  52. *Idem*, at 817.
  53. *Idem*. Courts may be reluctant to conclude that some sort of injury must have resulted from over-exposure to pollutants because of uneasiness regarding the way in which the so-called "safe" limits might have been set. They may feel that such limits were set on the basis of skimpy evidence of harm or as the result of highly subjective judgments. Some commentators believe that there may be grounds for such suspicions. See, for example, the conclusion of J. Hewings in *Water Quality and the Hazard to Health*, University of Toronto, 1968.
  54. See the discussion of *Allyn v. United States*, Reference 50.
  55. See, for example, *Kamo Electric Cooperative Ltd. v. Cusward*, 455, South West Reporter, 2d 513 (S. Ct. Mo. 1970).
  56. *Idem*.
  57. Klein, *Making the Most of Your Expert*, 46 Conn. B.J. 483, 489 (1972). "A chemical engineer, for example, can help with discovery by drafting interrogatories and making the results understandable." D. Hadden, *Private Damage Suits*, in Hasset, *Environmental Law* at 44 (Inst. of Cont. Leg. Ed., Ann Arbor, Mich. 1971).
  58. *Idem*.
  59. Note that the lawyer must take care in framing questions to ask his expert if the latter's opinion is required on conflicting evidence adduced in his presence at trial. In such circumstances the court, in its discretion may require the lawyer either to make clear the evidence on which the expert is being requested to base his conclusion or to put his questions in hypothetical form. The reason for imposing this requirement was expressed by the Supreme Court in the following words:  
In cases where the expert has been present throughout the trial and there is conflict between the witnesses, it is obviously unsatisfactory to ask him to express an opinion based upon the evidence which he has heard because the answer to such a question involves the expert in having to resolve the conflict in accordance with his own view of the credibility of the witnesses and the jury has no way of knowing upon what evidence he bases his opinion. When, however, there is no conflict in the evidence, the same difficulty does not necessarily arise and different considerations may therefore arise. . . . *Bleta v. The Queen*, (1964) S.C.R. 581, 565, 48 Dom. L.R. (2d) 139.
  60. "(T)he scientist who accepts the role as expert witness must be aware of the tactics commonly employed during courtroom litigation by opposing attorneys. The most common of these, of course, is an attempt to demean the witness or to make him look silly by confusing him or by asking him apparently simple questions that he cannot answer. Actually, what the opposing attorney does, and this is certainly no trade secret, is to state the factual situation to the expert over and over again but each time picking away at it by slightly changing the circumstances upon which the expert bases his opinion. . . ." D. Sive, *Scientists in the Courtroom*, in W. Thomas, *Scientists in the Legal System*, at 105-106 (Ann Arbor Science Pub. 1974).
  61. (1936), S.C.R. 4; 1 Dom. L.R. 331. The expert witnesses did disagree among themselves to the theoretical scientific evidence given.
  62. (1920) 51 Dom. L.R. 565 (C.A.) See *Re Hum Fong Shee*, (1967), O.R. 220 (C.A.) where the same principle was applied in resolving a conflict between lay and expert testimony. Cf. *Cassan v. Haig* (1914), 7 Ont. Wkly. Notes 267, (C.A.) Rev. 6 Ont. Wkly. Notes 437, 26 Ont. Wkly. Reports 695.
  63. Sive, at 11.
  64. Reference 37.
  65. (1866) Law Reports Vol. 1, Chancery 349 at 353.
  66. 1 E.R.C. 1131 (S. Ct. Mo. 1970).
  67. *Idem*. See Also the discussion of *Bortz Coal Co. v. Air Pollution Commission* in text, and the discussion of *A. P. Weper v. Sanitary Water Board*, Env. R.C., 1497 (Pa. Cmwlth, 1971), where the court invalidated the board's revocation of a mine drainage discharge permit because there were no dye tests performed which might have conclusively shown a causal connection between the mining operation and the pollution of a stream. The court said:  
We are by no means certain of the efficacy of dye tests to this situation or even if such tests are still possible, but it would seem that traces of dye might have surfaced in the Kiser spring had dye been placed, at different times, for example, in the open pit . . . and at the exploratory hole five yards to the south of the spring. This may well have yielded conclusive evidence and made unnecessary the bulk of speculative testimony which comprises much of the record. . . . *Idem*, at 1501.
  68. As a supposition a chimney may be needed to dilute a toxic gas which occurs only as a very rare situation, if at all. It may then be that winds which blow from a significant direction might occur only a small proportion of the time. In calculating heights of chimneys six atmospheric stability categories ranging from A to F are possible. The last is representative of extremely stable air and is the most unfavourable but occurs rarely. Category D representing average stability at nighttime usually is accepted for calculations. Use of this factor could result in a much lower chimney height at less cost though the small risk would be, at least, theoretically greater. On such an issue a cautious expert may be at some difference with another one even if the second uses the same basic formula.
  69. Klein, Reference 57, at 492.
  70. Sive, Reference 21, at 1194.
  71. A. Maloney, Q.C., *Expert Evidence in Defending a Criminal Case*, at 95, (Law Soc. of Upper Canada Special Series 1969).
  72. D. Sive, *Scientists in the Courtroom*, in W. Thomas, *Scientists in the Legal System*, at 104, (Ann Arbor Science Pub. 1974).

D-4

HOW TO TESTIFY

Training Material Presented in  
U. S. Environmental Protection Agency  
Air Training Institute Air Pollution Field Enforcement  
course

## HOW TO TESTIFY

If you are awkward, uncertain, or amateurish on the witness stand, the defense attorney can make you look like a fool and a rascal, and probably will. But if you can testify like an expert and a gentleman he can't ruffle you. Furthermore, the public, represented by citizens in the courtroom, will have the feeling that their property, possessions, and lives are being expertly protected by capable professionals in their department. When you are on the witness stand, your department is on public display as in a merchant's show window. Why not try to look as good as you are?

Why spend good money on an investigation and lose the fruits of it on the witness stand? You might as well fumble the ball after a 90 - yard run, just before you cross the goal line. Good witness stand techniques will yield more convictions of rascals, fewer injustice to innocent parties, better cooperation from law enforcement officers, valuable personality development for you personally, and economy of public funds.

Special thanks are due to Howard Hurd, Deputy District Attorney in charge of the Complaint Division, County of Los Angeles, for many ideas which have been included in this article. Valuable suggestions have been selected from an excellent paper, "Instructions to Witnesses," which Mr. Hurd prepared, and have been woven in among the ideas given on the same subject by arson men.

### A. YOUR IMPRESSION ON OTHERS

How to influence people by your appearance and conduct in court.

When you take the stand, all eyes are on you. Just what the judge and the jury think of your testimony will depend to a great extent on your appearance and conduct. If you dress and act the part of a solid citizen, what you say will have weight with those who determine the outcome of the trial. A few suggestions follow.

## 1. How to dress.

The most obvious way to make a good courtroom impression on others is by the way you dress. Your clothes are clearly visible. They make the first impression. Here are some suggestions worth following.

- a. Dress conservatively. As a representative of the department, in court on department business, dress accordingly. Wear a suit of conservative design and color, or your uniform. The suit should be dark and single-colored. A suit is preferable to gaudy or flashy clothes, such as sport clothes. Don't wear colors that clash. Wear a tie and a white shirt, never a sport shirt. Stay away from loud ties and socks. Wear business oxfords, not sport shoes. A hat will add to your appearance.
- b. Be neat and clean. Appear well scrubbed and exceptionally clean. Keep your hands and fingernails clean. Keep your face shaven and hair trimmed. Have your suit cleaned and well pressed. Have your shoes shined. Make sure that your clothes don't look as though they have been slept in. You wouldn't ask a juror for a job in shabby clothes; don't ask him for a conviction in them.
- c. Subdue your clothing accessories. Keep nothing but the essentials in your coat. Do not have pencils or cigars protruding from outside pockets. Wear no emblems, lodge pins, or rings. Do not wear loud, fancy, or distracting jewelry. Do not wear firearms in court.

## 2. How to present yourself in good courtroom demeanor.

Your conduct and attitude can go a long way in creating a favorable reception of the testimony you give in court. These ideas will show you how.

- a. Take the oath in a dignified manner. While you are taking the oath, look at the person who is administering it. Keep your right hand up until it is fully given. Then seat yourself comfortably in the witness chair. Get your poise.
- b. Be yourself. Be natural on the witness stand and feel as though you were talking to friends and telling them a story. You will make an ideal witness when you get into the frame of mind that you are speaking before a sociable, neighborly gathering. Don't worry about the effect your testimony will have on the audience. Don't wonder what the judge, jury, attorneys, and others are thinking about you. Relax and answer the questions in your own way.

- c. Remain calm. Keep your temper. Do not become angry or impatient because of interruptions of counsel. Never become arrogant or impress the court or jury with your importance. Don't permit anything to confuse you and make you nervous, irritable, or excited. Don't be so fearful or timid that you are not sure of anything.
- d. Refrain from making signs. You must not make signs. You must not nod or shake your head or make signals for yes or no, nor give signs of approval or disapproval of anyone who is being questioned. Such signs can't be properly recorded by the stenographer.

## B. YOUR SPEECH

How to talk when you are on the witness stand.

To assure the value of your testimony, it is important that your speech convey your competence as well as the full facts resulting from your investigation. The fruit of much tedious work must not be lost at the point of delivery, on the witness stand, due to ineffective speech or improper choice of words or manner.

### 1. How to be properly heard.

The effectiveness of your testimony depends upon your words being clearly understood in the entire courtroom and on the fact that your voice creates a favorable impression. Here are some suggestions regarding your courtroom voice.

- a. Make your words heard clearly in the courtroom. Speak loudly and enunciate distinctly. Do not run your sentences together. Do not hurry. Respond to questions as promptly as possible, but do not rush. Keep in mind that all of the jurors must hear you, and that the court reporter must take your testimony for the record, without the need for repetition. If a public address system is available, use it.
- b. Achieve a pleasing effect by means of your voice. Use your natural speaking voice, in conversational and steady tones. Do not yell or change your tone of voice except for inflections for emphasis. Speak in a gentle and pleasing tone.

### 2. How to achieve a good effect by your language.

To place your thoughts clearly and correctly on the record, your words and language must be well chosen, as follows.

- a. Make the meaning clear. Select your words carefully according to their proper meanings. Use layman's language and explain, if asked, any technical terms not understandable to the public. Avoid vague language and gestures in lieu of words, since they cannot be recorded in the stenographer's notes.
  - b. Avoid language faults and imperfections. Be as grammatically correct as possible. Do not use profanity, and avoid speech crutches (such as oh's and ah's) to fill in the pauses.
3. How to achieve good effects on the courtroom personnel by means of your attitude and audience contacts.

The proper attitude and behavior on your part, as explained below, will give weight to your testimony.

- a. Be respectful. Be polite and show proper respect to the court. Be confident and at ease, and yet speak with authority. However, avoid acting and being dramatic. Speak with simple sincerity and seriousness, and refrain from sarcasms and clever remarks. When cross-examined, use the same tone and attitude as you displayed on direct examination. Answer questions with simplicity and firmness, without any feeling of antagonism or resentment.
- b. Address the judge, the jury, or whoever asks the questions. If it is a trial by the court, speak toward the judge. If it is a trial by jury, turn toward the jury. When talking at length, share your glances between the judge or jury and the counsel table. Direct your answers to the person asking the questions. Remember at all times that the court reporter has to take down your words.

#### C. YOUR RESPONSES

How to answer the questions  
of the judge and attorneys.

Your answers are the principal part of the trial on which the judge or jury base their verdict. The aim of the direct examination is to bring out clear-cut evidence from your presentation. Your answers must be comprehensive but always consisting of specific, objective facts within your own direct observation. Therefore, your responses must follow closely the questions of your attorney and be void of extraneous material not directly bearing on the case. With a calm and courteous delivery of the facts you possess, the cross-questioning of the opposing attorney will not weaken or upset your testimony but rather strengthen it through the opportunity to re-state parts of it. Here are a few tips on how to answer effectively.

## 1. How to receive the questions.

Be very attentive at all times while on the witness stand. You must focus on the words as well as the meanings of the questions, and establish their clarity in your mind. If a question is obscure, it should not be answered until clarified. The record of your testimony should reflect concise statements clearly related to each question directly bearing on the case. Your alertness in appraising the questions will promote such results.

- a. Listen. To be sure you understand the question, listen carefully. Be sure you know what the person raising the question wants. Listen to the question in its entirety, and understand it thoroughly.
- b. Don't answer until the meaning of the question is clear. Before giving your answer, be sure you have the question clearly in your mind. If it is poorly phrased, be certain you know what is being sought. Don't answer any question you don't understand.
- c. Ask to repeat or clarify. If you do not understand the meaning of a question, say so. Ask to have it repeated or read from the record of the court reporter. If in doubt of the meaning of the question, ask for a clarification. Do not try to outguess the defense attorney; if his question carries a double meaning, ask specifically what he wants.
- d. Double questions. Don't confuse your testimony by phrasing a single compound answer to both parts of a double question. If you get a double question, answer both parts separately.
- e. Hypothetical questions. Beware of hypothetical questions. Do not hasten to testify to such questions, nor to be unnecessarily drawn into theoretical discussions beyond your facts and observations.

## 2. How to give the right kind of answers.

It is important that your testimony be void of elements of vagueness and be built from direct and objective statements. Your comprehensive testimony should be the sum of simple and specific facts.

- a. Be direct. State your answer as simply as possible to get the desired meaning across. Be responsive to the question. If you know the answer, give it directly and clearly. Talk to the point, and don't digress. Don't beat around the bush or hedge with your answers. If you do, later cross-examination will attack and may weaken your testimony.

- b. Be brief. Boil down your answer to be brief but complete. Say it briefly, but be sure you actually say it.
- c. Be objective. Testify to facts and physical evidence derived from your own observation. State only what you saw, said, heard, and did. In a case involving a contract, do not testify to conclusions, such as "he agreed," or "it was understood." Be accurate as to what you perceived through your own senses beyond any doubt, and do not report what probably happened.
- d. Don't report hearsay. State only facts that you personally know to be true. Don't quote others as having the same opinion. Relate conversations exactly as you remember them, using the exact words and phrases spoken. Avoid hearsay, since it is not admissible as evidence.
- e. Be cautious about yes and no questions. If you can answer a question by yes or no, do so. However, if a yes or no answer needs qualifying, say so. If an attorney insists on a yes or no, either tell him you cannot answer in this manner or answer him and then ask the judge if you can qualify the yes or no.
- f. Don't say "he" did. Say "Mr. Jones" did. Use the names of the persons to whom you refer rather than the personal pronouns, "he," "she," or "they."
- g. Answer completely. Be as explicit as time and conditions allow. Be precise and complete with your answers.

### 3. How to keep within the limits of what you really know.

Answer only the questions you are qualified to answer. Give only facts you possess. Don't be afraid to divulge the limits of your knowledge or your mistakes. Here are a few specific points along this line.

- a. Say "I don't know," if you really don't. When you are sure you don't know the correct answer, say "I don't know." Do not be afraid to say this in a clear and confident manner. "I don't know" does not mean ignorance on your part, only that you did not observe the facts directly.
- b. Say "I don't remember" when you are not positive that you don't know. Keep in mind that your saying "I don't know" closes examination on a point. Do not hesitate to say "I don't remember" if such is actually the case. The attorney may need to ask about things you have forgotten. Don't say "That is all:" rather say "That is all I can recollect." This will not close further inquiry into the subject.



- c. Qualify or limit your answers. If the positive and accurate answer is not known or cannot be substantiated, you must qualify your responses. Avoid positive answers when a lot of unsubstantiated detail is involved. Don't bluff an answer. It will get you involved.
- d. Admit your mistakes. If you make a mistake and it is called to your attention, admit it.

#### 4. How to cooperate with your attorney.

Concentrate on the attorney's trend of thought and reasoning in posing the questions. Wait for the complete question before you formulate your answer. A simple mistake in your testimony can lose the case. The pause necessary for framing your answer will also serve to allow time for raising objections according to court procedure. You must follow the line of questioning and avoid causing digressions.

- a. Address your responses correctly. In a court trial, direct your answers to the judge. In a trial by jury, direct your answers to the attorney and to the jury.
- b. Respond slowly. Take all the time you need to assimilate the question and to give the proper response. Think well before answering, and do not speak hastily. Organize your thoughts. Know exactly what you want to say, and how to say it. There is no great rush, but give your answer without hesitancy as soon as you reasonably can.
- c. Allow time for objections. Objections are to keep improper evidence out of the case. Attorneys object when rules are violated, or when they think so. Before answering questions, allow time for objections. When the opposing lawyer is examining you, pause long enough to give the Deputy District Attorney time to interpose an objection. If an objection is made, withhold further testimony until the judge sustains or overrules the objection.
- d. Don't volunteer information. Merely answer the question. If you don't know the answer, say so, but don't go off on tangents. Under cross-examination the questions will only relate to statements given under direct examination. Don't be talkative and open up other areas for cross-examination.

#### 5. How to deal with the opposing attorney.

Remember that the defense attorney, as a part of his job, must look for loopholes and contradictions in your testimony, and for opportunities to embarrass you. Therefore, you must be courteous and exercise

self-control during cross-questioning to avoid all emotional pitfalls. With a calm mind you are best able to remember the facts to which you testified earlier. The following points will help you deal with the opposing attorney.

- a. Treat both attorneys alike. Answer the defense attorney in the same courteous tone used to answer the prosecutor. Show the same respectful and unbiased attitude.
- b. Don't allow yourself to be irritated or angered. Be as unemotional as possible. Stay with the facts which you know, and don't become confused if the opposition tries unfairly to accuse you and upset you. Beware of becoming angry or losing your temper.
- c. Don't be led into an argument. Remain calm and do not become argumentative.
- d. Don't be misled or trapped. Be prepared for attempts by the defense attorney to distort your statements or lead you into giving conflicting testimony.
- e. Don't be clever. Be sincere and maintain a businesslike attitude at all times. Refrain from flippant, clever or sarcastic answers.
- f. Don't be timid. Speak with a calm air of confidence, and don't be timid as if you were not sure of your testimony.

D. PRECISION AND ACCURACY  
How to be exact and factual  
when you take the stand.

In the presentation of evidence to the court as a witness or investigator, you will be interested in the following suggestions for keeping your testimony precise and accurate.

1. How to assure accuracy on the stand by things you do beforehand. Here are some ideas on preparation before you present your case in court which will help you to testify more accurately.
  - a. Know your facts well. Before the trial you should be familiar with all phases of the case. Know all the facts you may be called upon to give. You should be sure of all the proper dates, the addresses, the times of day or night, etc., relating to the crime, your investigation, and your conversations. Knowing the details of the case well will insure accuracy in your answers.

- b. Review your testimony. Study your case thoroughly before court by reviewing all your notes and facts. Make a list of the questions you may be asked, and the best answers. Over-learn important facts by reviewing your reports so that you will be able to testify without hesitation. Review any conversations you have had prior to taking the stand.
- c. Get help from the District Attorney and your partner in the preparation of the case. Go over the case thoroughly with your partner in every detail several times. Especially do this the night before the case comes to trial. Prepare your testimony with the help of the District Attorney.
- d. Don't discuss the case with a witness who has preceded you on the stand. Don't discuss the case with anyone who has testified until you yourself have testified, to prevent coloring your testimony.

## 2. How to improve the accuracy of your answers while on the stand.

Your choice of words is a very important part of your giving your testimony properly. Here are some ideas from men who have had experience in testifying.

- a. Don't lie. If you stick to the truth and testify only to what you know to be true, you have nothing to fear. Cross-examination can't cross you up, and you won't be caught out on a limb. A witness caught in a lie at any stage of the proceedings will be condemned as unworthy of belief by the judge and the jury, and most if not all of his testimony will be discredited.
- b. Don't exaggerate. State the facts only as they exist. Don't attempt to color or exaggerate their significance.
- c. Don't guess. Never guess at any of your answers nor at what an attorney wants for an answer. Tell only what you know.
- d. Qualify yes or no answers. Ask permission of the court to qualify a yes or no answer and thoroughly explain it, if the answer warrants it.
- e. Select descriptive terms. When giving your opinion or testimony, try to select words that are especially descriptive. For example, if a man was nervous, say "His hands shook," "His speech was stumbling," "His forehead was covered with perspiration," etc.
- f. Give testimony of the substance of a conversation. You are not expected to remember the exact words that were said, but you are

expected to remember the substance of a conversation. You may be able to memorize conversations of this sort, but you are not expected to do so.

### 3. How to substantiate the accuracy of your verbal testimony.

Here are some ideas that will help you to refresh your memory on the witness stand, and enable you to check on details that you might otherwise forget.

- a. Refer to your notes. If it is necessary to refer to the notes that you prepared beforehand to help you to substantiate the facts of the case, do so only after you have asked the judge's permission. Be prepared to answer all the questions of distance, depth, width, etc., with actual measurements you yourself took. When you refer to your notes, make certain beforehand that there are no embarrassing comments in your notebook, since the defense has a right to examine it and may possibly read some excerpts aloud.
- b. Exhibit other evidence. Do not testify to what you think without evidence to back it up. Use photographs whenever it is possible to describe subject matter. Mark all your exhibits and evidence so that when you are asked to acknowledge them you will be able to do so.

## E. FAIRNESS AND JUSTICE

How to achieve and display fairness.

To be fair and to seem fair are both very important. Having made your investigation, and having been convinced of guilt, you enter the trial prejudiced. But you can at least be fair. If you heed the following suggestions of experienced men in the field, you may find this easier to do.

### 1. How to BE fair.

Here are some ideas on how to do your duty without being an enemy of the defendant.

- a. Don't be dogmatic. A man is considered innocent until he is proven guilty beyond a reasonable doubt in criminal cases. If your opinion is asked, give it, but stay within the limits of what is allowable as expert opinion. Do not make false accusations. Give your testimony just as it was seen or presented to you. Never let your personal feelings enter into your testimony.

- b. Don't be influenced by other witnesses. Don't be influenced by the testimony given on the stand by another witness. Stick to what you know.
- c. Don't let attorneys put words into your mouth. Allow enough time to think over the question before you answer it. Don't allow either attorney to put into your mouth words you don't intend to say.
- d. Avoid terms that are derogatory. Do not refer to the defendant in a derogatory manner. Avoid references to race, color, etc. Try not to color your report, avoiding loaded words and phrases. Word your answers so as not to offend anyone whenever possible. Show complete courtesy to the defense counsel, by addressing him by his name, preceded by "Mister."
- e. Don't omit the whole truth. Even though some of the facts may put the defendant in a favorable light, give your testimony in its entirety. The facts will speak for themselves. Include all the points, both major and minor, that will indicate that you gave the case a thorough investigation.

## 2. How to SEEM fair.

Here are some ideas on how to handle yourself so that you will appear completely square and just in your testimony.

- a. Don't SEEM prejudiced. You are relating the facts. You are not the judge or the jury. By your answers you can convince the court that you have treated and are treating the defendant fairly. Let the facts speak for themselves, to lead the judge or jury to their own conclusions as to guilt or innocence.
- b. Admit that you talked about the case to others. "Did you talk to anyone else" is used in cross-examination to frighten you when your credibility cannot be attacked any other way. Don't be afraid to admit that you have talked over the case with friends, relatives, or attorneys, since this is normal and usual behavior.
- c. Treat both the defense and prosecuting attorneys alike. Be careful not to let your manner or tone change in your response to the questions of the defense counsel from your manner in answering the District Attorney. Don't show any antagonism or resentment. Give no more weight to the prosecution answers than to the defense answers.
- d. Don't defend yourself against personal attacks. Cross-examination is to see if you are honestly mistaken in your testimony.

Try to understand that both sides are trying to win the case. Personal attacks are a tool used for this purpose. If you are absolutely fair and unprejudiced, you need not worry about the opposing counsel's trying to discredit your testimony. Don't argue with him. The judge and your attorney will protect you from insult.

- e. Don't try to win the audience. Don't worry about the effect of your answers on the audience during cross-examination.
- f. Don't begrudge the defense a favorable point. The inclusion in your testimony of minor points that may be slightly biased for the defense will strengthen the court's faith in your testimony, even though you may feel that it slightly hinders your case. You might mention that the defendant was "cooperative," but stress the details of the actual crime. Acknowledge readily any information you may have which appears to help the defendant. Don't hesitate to answer. Never insist on the truth of what is incorrect.
- g. Don't appear irked by setbacks in your case. Keep animosity from your mind. You are regarded as an expert, so do not become an amateur by bickering about unimportant details. Do not become surly, if a witness changes his story from the original.
- h. Don't try to give your friends an advantage. If you are a friendly witness, you will hurt your friend's case by a display of partisanship.

## F. OPINION EVIDENCE

How to testify on matters other than facts:

Since much of your evidence may be based on matters of opinion, you will be interested in some ideas given by experienced arson investigators on how to help make your case a valid one in the presentation of your opinions.

### 1. How to formulate your opinions about the case so they will stand up in court.

Here are some suggestions on how to substantiate your testimony by presenting your opinions properly.

- a. Base each opinion on facts. Tell the court the facts that cause you to form a certain opinion. Use the facts as presented in court to reinforce your testimony. An opinion, if absolutely necessary, can be submitted indirectly by describing every factual thing in connection with it.

- b. Clarify in your own mind the point at which the facts end and your opinion begins. Do not add short opinions or explanations to the facts. If you are giving your opinion, say so. Be careful to keep what is opinion separate from what is fact. Give only facts as fact.

2. How to qualify yourself as an expert, so that your opinion will carry weight.

A few ideas from arson men will assist you to substantiate your testimony by qualifying yourself as an expert in court..

- a. State that you are an expert. Your opinion should only be given in court when you are called upon and qualified as an expert witness. With the aid of the trial deputy's questions, classify yourself as an expert in bookmaking, narcotics officer, etc.
- b. Give your experience, qualifications, or proofs. When classifying yourself as an expert, give accurate statements as to your background, experience, and preparation, justifying the value of your opinion. Your opinion as an expert witness must be entered into the records of the preliminary hearing. If there is an expert witness who is more qualified than you to answer a certain question, make this fact known.

3. How to defend your opinion on other grounds than your recognize expertness.

You won't have to worry much about defending your opinions if they are based on sound facts, rather than on hypothetical ideas. Here are some ways to help prepare yourself to substantiate them.

- a. Give your opinion only when asked. The proper time to testify to your opinion is when you are specifically asked for it on the points pertaining to the offense.
- b. Stand by your opinion. Don't be afraid or ashamed of your considered opinion. Stick with it. Speak confidently and with assurance. Your opinion is based on the know-how of experience, and is not a figment of your imagination.
- c. Give the facts on which your opinion is based.
- d. Give the reasoning by which you arrived at the opinion in working from the facts.

G. SUMMARY

Some good advice from your friend,  
the prosecuting attorney.

Here in a nutshell is the evidence which was prepared for witnesses by Howard Hurd, Deputy District Attorney in charge of the Complaint Division, County of Los Angeles. It is his summary of his own paper on "Instructions to Witnesses," and it is a fitting summary for this article also.

Understand the question.

Be responsive.

Be courteous and honorable.

Be at ease.

Use the names of the persons to whom you refer.

Take sufficient time to answer the question.

Be honest and fair at all times.

Be truthful.

Be natural.

Fear nothing.

Answer slowly (Take your time).

DON'T:

" Be too talkative.

" Say "That is all;" but say "That is all I remember."

" Be timid or fearful.

" Argue.

" Be clever.

" Be important.

" Guess.

" Lose your temper.

" Hurt your friend's case by being partisan.

It is understood that ordinarily you cannot remember the exact words used.

The judge and lawyers are gentlemen, and the judge especially will protect you from insult.

Your answers to the opposing attorney should be given in the same manner, tone, and attitude as your answers to my questions.

Remember that the law presumes you to be truthful.

Again I say, "Get into the frame of mind that this is a sociable, neighborly gathering, and you will make an ideal witness."



D-5

SUGGESTIONS FOR WITNESSES

T. H. Truitt  
Office of General Counsel  
U. S. Environmental Protection Agency

## SUGGESTIONS FOR WITNESSES

The following suggestions are made to you as a prospective witness in order to lessen the fears and suspicions which almost everyone has when he first testifies either before a board, commission, hearing officer, or in court. Even those who have testified previously encounter a certain anxiety when they hear they will be called for a repeat performance. When you are properly prepared, both with regard to the subject matter of your testimony and your conduct on the witness stand, you should not have any fear about testifying. You will be thoroughly prepared as to the subject matter of your testimony. You will also be instructed with regard to your conduct as a witness. However, in order to assist in the latter instructions, the following suggestions are given with a firm request that you read what follows several times before you actually sit in the witness chair.

You undoubtedly will be required to take an oath as a witness to tell nothing but the truth. The important point to remember is that there are two ways to tell the truth--one is a halting, stumbling, hesitant manner, which makes the board member, hearing officer, judge or jury doubt that you are telling all the facts in a truthful way, and the other is in a confident, straightforward manner, which inspires faith in what you are saying. It is most important that you do your best to testify in the latter manner. To assist you in testifying in such a manner, a list of time-proven hints and aids which, if followed, will make your testimony much more effective are listed below.

### General Instructions:

(1) If you are to be a witness in a case involving testimony concerning the appearance of an object, place, condition, etc., try to refresh your recollection by again inspecting the object, place or condition, etc., before the hearing or trial. While making such inspection, close your eyes and try to picture the item and recall, if you can, the important points of your testimony. Repeat the test until you have thoroughly familiarized yourself with the features of your testimony that will be given.

(2) Before you testify, visit a court trial or board hearing and listen to other witnesses testifying. This will make you familiar with such surroundings and help you to understand some of the things you will come up against when you testify. At least be present at the hearing of the matter in which you are to testify in sufficient time to hear other witnesses testify before you take the witness chair.

(3) A good witness listens to the question and then answers it calmly and directly in a sincere manner. He knows the facts and can communicate them. He testifies the same way on cross-examination as he does on direct examination.

(4) Wear neat, clean clothes when you are to testify. Dress conservatively.

(5) Do not chew gum while testifying or taking an oath. Speak clearly and do not mumble. Of course, you will not be permitted to smoke while testifying.

#### Direct Examination:

In a discussion on administrative procedures, E. Barrett Prettyman, Retired Chief Judge, U.S. Court of Appeals for the District of Columbia, gave the following advice:

"The best form of oral testimony is a series of short, accurate, and complete statements of fact. Again it is to be emphasized that the testimony will be read by the finder of the facts, and that he will draw his findings from what he reads... Confused, discursive, incomplete statements of fact do not yield satisfactory findings."

(6) Stand upright when taking the oath. Pay attention and say "I do" clearly. Do not slouch in the witness chair.

(7) Do not memorize what you are going to say as a witness. If you have prepared such answers to possible questions, by all means do not memorize such answers. It is, however, very important that you familiarize yourself as much as possible with the facts about which you will be called upon to testify.

(8) Be serious at all times. Avoid laughing and talking about the case in the halls, restrooms or any place in the building where the hearing or trial is being held.

(9) While testifying, talk to the board member, hearing officer or jury. Look at him or them most of the time, and speak frankly and openly as you would to any friend or neighbor. Do not cover your mouth with your hand. Speak clearly and loudly enough so that anyone in the hearing room or courtroom can hear you easily. At all times make certain that the reporter taking the verbatim record of your testimony is able to hear you and record what you actually say. The case will be decided entirely on the words that are finally reported as having been the testimony given at the hearing or trial. Always make sure that you give a complete statement in a complete sentence. Half statements or incomplete sentences may convey your thought in the context of the hearing but may be unintelligible when read from the cold record many months later.

#### Cross Examination:

Concerning cross examination, Judge Prettyman gives the following advice to prospective witnesses:

"Don't argue. Don't fence. Don't guess. Don't make wisecracks. Don't take sides. Don't get irritated. Think first, then speak. If you do not know the answer to a question, say so. If you do not know the answer but have an opinion or belief on the subject based on information, say exactly that and let the hearing officer decide whether you shall or shall not give such information as you have. If a "yes or no" answer to a question is demanded but you think that a qualification should be made to any such answer, give the "yes or no" and at once request permission to explain your answer. Don't worry about the effect an answer may have. Don't worry about being bulldozed or embarrassed; counsel will protect you. If you know the answer to a question, state it as precisely and succinctly as you can. The best protection against extensive cross examination is to be brief, absolutely accurate, and entirely calm."

(10) The hearing officer, board member or jury only wants the facts; not hearsay, nor your conclusions, nor opinions. You usually cannot testify about what someone else has told you.

(11) Be polite always, even to the other attorney.

(12) Do not be a smart aleck or cocky witness. This will lose you the respect and objectivity of the trier of the facts in the case.

(13) Do not exaggerate or embroider your testimony.

(14) Stop instantly when the judge, hearing officer or board member interrupts, or when the other attorney objects to what you say. Do not try to sneak your answer in.

(15) Do not nod your head for a "yes" or "no" answer. Speak out clearly. The reporter must hear an answer to record it.

(16) If the question is about distances or time and your answer is only an estimate, be certain that you say it is only an estimate.

(17) Listen carefully to the questions asked of you. No matter how nice the other attorney may seem on cross-examination, he may be trying to hurt you as a witness. Understand the question. Have it repeated if necessary; then give a thoughtful, considered answer. Do not give a snap answer without thinking. You cannot be rushed into answering, although, of course, it would look bad to take so much time on each question that the board member, hearing officer of jury would think that you are making up the answers.

(18) Answer the question that is asked--not the question that you think the examiner (particularly the cross-examiner) intended to ask. The printed record shows only the question asked, not what was in the examiner's mind and a nonresponsive answer may be very detrimental to your side's case. This situation exists when the witness thinks "I know what he is after but he hasn't asked for it." Answer only what is asked.

(19) Explain your answers if necessary. This is better than a simple "yes or no". Give an answer in your own words. If a question cannot be truthfully answered with a "yes or no" you have a right to explain the answer.

(20) Answer directly and simply the question asked you and then stop. Never volunteer information.

(21) If by chance your answer was wrong, correct it immediately; if your answer was not clear, clarify it immediately.

(22) You are sworn to tell the truth. Tell it. Every material truth should be readily admitted, even if not to the advantage of the party for whom you are testifying. Do not stop to figure out whether your answer will help or hurt your side. Just answer the question to the best of your memory.

(23) Give positive, definite answers when at all possible. Avoid saying "I think", "I believe", "in my opinion". If you do not know, say so. Do not make up an answer. You can be positive about the important things which you naturally would remember. If asked about little details which a person naturally would not remember it is best to say that you do not remember, but do not let the cross-examiner place you in the trap of answering question after question with "I don't know".

(24) Do not act nervous. Avoid mannerisms which will make it appear that you are scared, or not telling the truth or all that you know.

(25) Above all, it is most important that you do not lose your temper. Testifying at length is tiring. It causes fatigue. You will recognize fatigue by certain symptoms: (a) tiredness, (b) crossness, (c) nervousness, (d) anger, (e) careless answers, (f) willingness to say anything or answer any question in order to leave the witness stand. When you feel these symptoms, recognize them and strive to overcome fatigue. Remember that some attorneys on cross-examination are trying to wear you out so you will lose your temper and say things that are not correct, or that will hurt you or your testimony. Do not let this happen.

(26) If you do not want to answer a question, do not ask the judge, hearing officer or board member whether you must answer it. If it is an improper question, your attorney will object for you. Do not ask the presiding officer, judge or board member for advice.

(27) Do not look at your attorney or at the judge, hearing officer or board member for help in answering a question. You are on your own. If the question is an improper one, your attorney will object. If the judge, hearing officer or board member then says to answer it, do so.

(28) Do not hedge or argue with the opposing attorney.

(29) There are several questions which are known as "trick questions". That is, if you answer them the way the opposing attorney hopes you will, he can make your answer sound bad. Here are two of them:

(a) "Have you talked to anybody about this matter?" If you say "no," the hearing officer or board member, or a seasoned jury, will know that is not right because good lawyers always talk to the witnesses before they testify. If you say "yes," the lawyer may try to infer that you were told what to say. The best thing to say is that you have talked to Mr. \_\_\_\_\_, your lawyer, to the appellant, etc., and that you were just asked what the facts were. All we want you to do is simply tell the truth.

(b) "Are you getting paid to testify in this appeal?"  
The lawyer asking this hopes your answer will be "yes," thereby inferring that you are being paid to say what your side wants you to say. Your answer should be something like "No, I am not getting paid to testify; I am only getting compensation for my time off from work, and the expense it is costing me to be here." A witness should never be paid a contingency fee as it indicates strongly that since his compensation depends upon the results, he will be inclined to overstate the case.

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THE CHAIN OF CUSTODY RULE AND THE  
COLLECTION AND TRANSMISSION OF SAMPLES

Problem

In order to introduce in evidence any tests of water samples where the sample has passed through several hands, you must account for the continuous custody of the sample from the time taken to the time of analysis, and you must also show that the sample was properly preserved or cared for until analysis.

Discussion

When you testify regarding your role in either sampling or testing, be prepared for extensive cross examination by the discharger's attorney attempting to show that there has been a "break" in the chain of custody of the sample taken. That is, the attorney will attempt to show that (a) the sample has been confused with a sample from another source, (b) the sample was contaminated after the sampling process and before testing, or (c) we cannot account for the whereabouts of the sample for a period of time before testing, thus the presence of pollution may be due to some unspecified occurrence while the sample was out of our custody. Most of the "chain of evidence" problems can be avoided by following these four recommendations:

1. To the maximum extent possible, make sure as few people as possible handle the sample. In order to prove the "chain of custody," the United States Attorney will have to call every person who had possession of the sample from the time it was taken until testing was completed, and a lengthy parade of witnesses to the stand not only gives the discharger's attorney the maximum number of targets for cross examination, but also creates a substantial preparation problem for the government's attorney.

2. Attach a tag to the sample container containing spaces on which the following information can be recorded.

- (a) Name of person having custody of sample,
- (b) Hour and date when sample is received,
- (c) How sample is delivered (mail, hand delivered, etc.),
- (d) Person to whom sample forwarded,
- (e) Date, time and method of forwarding.



This information should be recorded by each person who handles the sample, so that one can examine the transfer tag and follow the progress of the sample from collection to testing. The following may be used as a guide in preparing transfer tags, if printed ones are not available.

1. NAME _____ HOUR & DATE RECEIVED _____ DELIVERY METHOD _____ DELIVERED TO _____ DELIVERED ON _____	3. NAME _____ HOUR & DATE RECEIVED _____ DELIVERY METHOD _____ DELIVERED TO _____ DELIVERED ON _____
2. NAME _____ HOUR & DATE RECEIVED _____ DELIVERY METHOD _____ DELIVERED TO _____ DELIVERED ON _____	4. NAME _____ HOUR & DATE RECEIVED _____ DELIVERY METHOD _____ DELIVERED TO _____ DELIVERED ON _____

3. The transfer tag should be firmly attached to the sample jar immediately upon obtaining the sample, and should not be removed at any time. If possible, use a metal seal or heavy clip to secure the tag to the container to eliminate any claim that tags could have been mistakenly exchanged after sampling.

4. After filling, the sample container should be sealed with a gummed lable or other device which prevents the opening of the container without breaking the seal. By this method the chemist can be certain that the sample has not been tampered with prior to delivery to him.

#### Examples

1. "A", an EPA employee, obtains a sample of the Jones Company's effluent on January 6, 1971. He gives it to Smith who asks his newspaper boy to deliver it to the local EPA lab for testing. Although the lab technician testified at trial that he found a sample on his doorstep on the following day marked "Jones Company effluent - 1/6/71" and performed his tests properly, the judge would probably refuse to accept the sample in evidence on the basis that EPA could not account for its continuous custody prior to testing, with the result that the case would be dismissed if the sample was the only proof that the Company was discharging "refuse".

2. The criminal case against the Smith Company came to trial four years after the samples were taken due to a backlog on the local court's docket. As a result of reviewing the information on the transfer tag attached to the sample, all EPA personnel involved in the sampling and the handling of the sample were able to refresh their memories as to the steps they had followed four years earlier and the sample was admitted into evidence and a conviction obtained.

THE CHAIN OF CUSTODY RULE AND  
THE LABORATORY ANALYSIS OF SAMPLES

Problem

As noted in section III, you must account for the continuous care and custody of all samples from the time of collection to the time of analysis. The following recommended procedures are intended to ensure that the attorney for the discharger cannot successfully claim that there has been a "break" in the chain of custody once the sample has reached the laboratory.

Discussion

Each permanent laboratory should designate one full time employee as a "sample custodian." Since this individual will be called as a witness in all court cases in which samples analyzed by the lab are offered in evidence, he should be an effective speaker and the sort of person who will not easily be confused or upset by cross-examination. In addition to appointing a custodian, the laboratory should set aside a "sample room." This should be a clean, dry, isolated room which contains refrigeration facilities and is capable of being securely locked from the outside. The custodian is responsible for maintaining a bound log book in which he will record the following information with respect to each sample received:

1. Name of person receiving the sample
2. Data received
3. Source of sample (Company, municipality, etc.)
4. Sample number from tag
5. How transmitted (mail, courier, etc.)
6. Accession number assigned by laboratory

The following procedures should be observed in order to satisfy the "chain of custody" requirements within the lab:

1. All samples should be handled by the minimum possible number of persons.

2. All incoming samples shall be received only by the custodian, who will indicate receipt of the sample on the transfer tag attached to the container.

3. Immediately upon receipt the custodian will affix an accession number to the attached tag, record the required information in the log book and place the sample in the sample room, which will be locked at all times except when samples are removed or replaced by the custodian. To the maximum extent possible, only the custodian should be permitted in the sample room.

4. The custodian will ensure that heat-sensitive or light-sensitive samples, or other sample materials having unusual physical characteristics or requiring special handling are properly stored and maintained.

5. Only the custodian will distribute samples to personnel who are to perform tests. The custodian will ensure that the laboratory personnel complete the required receipt information on the tag prior to surrendering custody of the sample.

6. Laboratory personnel should examine the seal on the container prior to opening and should be prepared to testify that their examination of the container indicated that it had not been opened or otherwise tampered with.

7. The discharger's attorney will probably be able to establish that Standard Methods is the water analysis "Bible" though there are admittedly other authoritative texts. If laboratory personnel vary the procedure set in Standard Methods, they should be prepared to justify their decision during cross-examination.

8. Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them and should be prepared to testify that the sample was in their possession and view or securely locked up at all times from the moment it was received from the custodian until the tests were run.

9. Once the sample testing is completed, the unused portion of the sample together with all identifying tags should be returned to the custodian who will complete the receipt tag and retain the tagged sample in the sample room until it is required for trial.

10. The person conducting laboratory tests should prepare complete and detailed notes describing the sample (by origin and sample identification number), the procedures performed and the results of the testing. The notes should be typed up, signed and dated by the person performing the tests and retained as a permanent record in the laboratory. In the event that the person who performed the tests is not available as a witness at time of trial, the government may be able to introduce the notes in evidence under the Federal Business Records Act.

11. Samples, tags and laboratory records of tests may be destroyed only upon the order of the laboratory director, who will first confer with the regional enforcement officer to make certain that the information and samples are no longer required.

#### Examples

1. "J", a chemist in an EPA laboratory, completed testing a sample taken from the Jones Company's outfall. Knowing that no further tests would be run on the sample, he threw out the two cards attached to the neck of the sample bottle and returned the bottle to the sample room with a note stating "Remainder of Jones Company sample. Testing completed 8-6-71." Since the custodian was not in the unlocked room, the error was not discovered until the case was ready for trial 1 1/2 years later, when the government attorney was forced to spend two weeks attempting to determine the names of the various people who had handled the sample, since the transfer tag containing this information was not available.

2. "J", and EPA chemist, received a sample from the custodian at 4:45 on Friday afternoon. He left the sample on lab table during the weekend, but completed his testing promptly on Monday and found high concentrations of cyanide. At trial, the discharger's attorney carefully examined each witness who had custody of the sample and discovered the above facts. During a lengthy (and unpleasant) cross-examination "J" was forced to admit that: (a) "Someone" could have added cyanide or switched sample bags on the bottle during the weekend; (b) he could not testify "with absolute certainty" that the bottle he tested on Monday was the same one he left on Friday since "all sample containers look pretty much the same," though the information on the tag was identical; (c) "J" knew that he should have returned the bottle to the custodian before leaving the lab; (d) cleaning personnel had access to the lab over the weekend, and (e) he really didn't know what, if anything, had happened to the sample over the 48 hours it sat unattended on the lab table.

THE FIFTH AMENDMENT RIGHT  
AGAINST SELF INCRIMINATION

Problem

The Fifth Amendment of the United States Consitution provides in part that no person shall be compelled in any criminal case to be a witness against himself. This section discusses the scope of the protection afforded by the Fifth Amendment as applied to discussions and interviews with the officers or employees of a discharger.

Discussion

The 1889 Refuse Act is a criminal statute providing for fines up to \$2500.00 and prison sentences of up to one year. Therefore, whenever you are involved in the investigation of a Refuse Act criminal case, the possibility of a Fifth Amendment problem is always present. However, the right against self incrimination may not be claimed by a corporation and is not available in civil cases. Therefore, the followed suggested procedure is limited solely to the investigation of criminal cases against individuals, proprietorships (an unincorporated business owned by one man) or partnerships (a business owned by two or more men which is not incorporated). (See the attached "Guidelines," section 2.e., for the description of a typical criminal case under the Refuse Act.)

If you find that you are involved in the investigation of a Refuse Act criminal case against either a proprietorship, partnership or an individual person, do not attempt to discuss any aspect of the case with the individual or any employee of the proprietorship or partnership unless:

(a) the regional enforcement officer or a number of his staff is present, or

(b) you have discussed the matter in advance with the regional enforcement officer and have received instructions as to scope and content of the interview. In all other situations, you need not be concerned about a "Fifth Amendment" problem, and may conduct sampling, etc., in the manner described in other portions of the manual.

THE FOURTH AMENDMENT PROTECTION AGAINST  
UNREASONABLE SEARCHES AND SEIZURES

Problem

The Fourth Amendment of the United States Constitution provides that the people should be secure in their persons, houses, papers and effects from "unreasonable searches and seizures." In the event that you obtain samples or other evidence of a violation by means of an "unreasonable" search, this evidence cannot be introduced at trial.

Discussion

Any time that you enter private property without the consent of the owner in order to gather any evidence of a violation, you run the risk that the discharger may claim that information obtained in this manner was the result of an "unreasonable search and seizure" and cannot be admitted in evidence against him. Unlike the Fifth Amendment right against self incrimination, both individuals and corporations may claim the benefit of the Fourth Amendment in either a civil or a criminal case. Therefore, if at any time you find it necessary to enter a discharger's plant to inspect the facility, examine records, cross onto his property to obtain a sample, or in any way enter privately owned property during the course of an investigation, you must obtain the consent of the property owner or the person in charge. To obtain a valid consent follow these five steps:

1. Locate the owner, plant manager or other responsible plant official who states to your satisfaction that he has authority to allow you to enter the premises.
2. Tell this person that you are from EPA and show him your credentials.
3. Explain that you wish to obtain a sample from his coking plant, inspect his records, locate an outfall, etc.
4. Request that he give his consent on behalf of the Company for you to take the sample, inspect, etc.

To ensure that there is no misunderstanding, at least one other EPA employee should be present when the above facts are explained and the consent obtained. For purposes of future testimony in court, each of you should prepare and retain notes covering the above five points, and also including:

1. The name and title of the person from whom the consent was obtained.

2. The date, time and place when the consent was obtained. The law requires that any consent given must be "informed" and "voluntary." This means that any consent obtained by threats, misleading information, or other questionable methods may not be admissible in evidence. Therefore, be frank and open with the Company's representative as to the reason for your visit and attempt to answer his questions fully. In the event that you do not obtain a consent after you have discussed the matter, leave the premises immediately and contact your regional enforcement officer and ask if he will assist you in obtaining a search warrant.

### Examples

1. EPA personnel called on "X" plant requesting permission to enter and sample the Company's effluent which was discharged from an outfall located on Company property. They talked with Mr. Johnson who identified himself as a custodian and said "none of the big bosses are around, but you can look if you want to." Since Mr. Johnson, as a custodian, may be merely a cleaning man who has no authority to consent to a search, the EPA personnel should either (a) make certain that he does, in fact, have the authority and, if not (b) find someone who does and attempt to obtain his consent.

2. On August 30, 1971, "J", an EPA employee, was sampling on the Chlorine River in a rowboat when he noticed an outfall pipe on the shore about five feet from the edge of the water. "J" climbed a low fence which had a sign on it "Property of Jones Company", filled a sample container and returned to the boat. He was only on Jones property for 30 seconds, did not disturb anything and spoke to no one. On returning to the office, "J" did not mention to his supervisor how he had obtained the sample. Testing of the sample disclosed high concentrations of phenol, cyanide and ammonia and, since the Jones Company had failed to apply for a Refuse Act permit, a civil suit was commenced to enjoin the Company from further discharges. In the process of preparing for trial, the Company's attorney took "J's" deposition (statement under oath), discovered the above facts and immediately filed a Motion to Suppress the sampling results on the basis that the evidence was obtained by means of an unreasonable search and seizure in violation of the Fourth Amendment of the U.S. Constitution. Although the judge has not yet ruled on

the Motion, the case has been delayed for two months while the attorneys filed briefs, and the Jones Company has continued to discharge. The United States Attorney has privately indicated to "J's" supervisor that he expects to lose the pending Motion and if this occurs, it will be necessary to obtain new samples and begin the case again.

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D-6

APPEARANCE AS WITNESS

U. S. Environmental Protection Agency  
Pesticides Inspection Manual  
June 1975

## APPEARANCE AS WITNESS

### A OBJECTIVE

To make the employee a better witness in the event he is called upon to testify in civil and criminal proceedings pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

### B PERSONAL APPEARANCE

A well groomed, neatly attired witness makes a more favorable impression in the courtroom.

### C GENERAL CONDUCT IN COURTROOM AND VICINITY

See Exhibit 22A, A Guide to Deportment in the Courtroom for more detailed information regarding appearance as a witness.

1. Your conduct should reflect the solemn nature of the judicial proceedings.
2. Don't discuss the case with the defendant or his attorney.
3. Do not whisper or talk to another person, or cause any disturbances in the courtroom.
4. Do not talk to the jurors or discuss the case within their hearing.
5. Do not sit within the enclosure unless instructed to do so.
6. Do not bring magazines or newspapers into the courtroom.
7. Show no incredulity or surprise at any testimony given from the witness stand or at statements made by the defense attorney.
8. Be on time when court opens and be available immediately when called to testify.

### D PROPER TECHNIQUE ON THE WITNESS STAND

1. When called to the witness stand, unless previously sworn, go directly to the desk of the clerk of the court to be sworn.
2. Take the oath in a solemn manner. Then proceed to the witness chair. If you have a long or difficult name, give a card or paper with the correct spelling to the court stenographer.
3. Assume and maintain proper posture, bearing and demeanor.

## Appearance As Witness

- a. Sit erectly, but don't appear stiff or tense.
- b. Always be courteous, say "Yes Sir/Mam" and "No Sir/Mam."
- c. Speak in a clear, distinct and well modulated voice.
- d. Look at and speak distinctly to the jury. Speak plainly enough so the farthest juror can hear you.
- e. Do not speak to the judge unless he asks you a question.
- f. Be factual.
- g. Do not show hostility toward the defendant.
- h. Do not use idioms or language peculiar to your profession.
- i. Be well poised and under self control.
- j. In your effort to appear impartial and unbiased, do not become listless or "dead pan." Be natural, candid, frank, and "alive."
- k. Do not appear impatient or overly anxious to testify.
- l. Do not have anything in your mouth. This includes gum, toothpick, tobacco, candy or food.
- m. Keep your hands away from your mouth, face and head.
- n. Attempt to minimize nervous tendencies, such as, arranging clothes, tie, etc.

## E THE DIRECT EXAMINATION

The following guidelines are applicable to both direct and re-direct examination.

1. Laying the Foundation For Your Testimony
  - a. Questions pertaining to your identification, occupation and qualifications are usually asked first.
  - b. The next questions are usually asked to indicate the scope and relevancy of your testimony.

## Appearance As Witness

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### 2. Your Testimony

- a. Always tell the truth.
- b. Answer only the question asked. Do not volunteer additional information.
- c. Do not be afraid to say, "I don't know," if indeed you do not know the answer. This answer should never be used to be evasive.
- d. Do not give personal opinions.
- e. Do not be hesitant about using your contemporaneous notes to refresh your memory and you should do so in cases of complicated figures, dates, etc.
- f. If you do refresh your memory from notes, the defense has the right to examine them and make them an exhibit in the case.
- g. If the defense objects to a question, do not try to get in an answer before the judge has ruled on the objection.

### F CROSS EXAMINATION

The following guidelines are applicable to both cross and re-cross examination.

1. A. through g. under 22E2. are equally important when testifying under cross examination.
2. Under cross examination you may be subjected to more vigorous questioning than you were under direct examination.
3. The defense attorney may attempt to intimidate you by attacking your veracity and integrity or by uncomplimentary references to your qualifications or length of service or by emphasizing errors you have made. If this occurs, you should remain calm and answer the question asked unless an objection is raised by the attorney and sustained by the the judge.
4. If the cross examiner attempts to confuse you with rapid questions you should:
  - a. Answer him deliberately and at a comfortable pace.
  - b. Ask him to repeat or restate any unclear or confusing question.

## Appearance As Witness

5. Do not attempt to be argumentative with the cross-examiner if he interrupts your testimony. The U. S. or EPA Attorney should make an objection to the judge if the interruption is not warranted.
6. He may ask a double or two pronged question. Ask him to restate it or carefully answer each part separately.
7. Beware of questions to which he demands a "Yes" or "No" answer if the question cannot be properly answered with a yes or no.
8. If the cross examiner should misquote any of your earlier testimony when asking a question you may correct the misquote before answering the question.
9. If you make an error while testifying, correct it at the first opportunity. If you discover the error after you have completed your testimony and have been dismissed, you should discuss the matter with the U. S. Attorney. If you are caught in an error, admit it and explain it if possible.

### G PROPER CONDUCT AFTER TRIAL

After the trial is completed you should continue to conduct yourself in a manner to bring credit on yourself and the Agency. You should make no public display of elation or disappointment over the outcome of the case.

If there is an occasion to speak to the defendants you should be courteous regardless of their demeanor.

### A Guide to Deportment in the Courtroom

Court contests are often won by the side mustering the most impressive witnesses. An impressive witness is not necessarily one endowed with spellbinding powers of speech nor one possessed of profound knowledge. He is usually one who in testifying impresses his listeners with his honesty, straightforwardness, knowledge, and truthfulness.

There are, of course, the "brilliant witnesses" - those who display the happy faculty of stating facts, no matter how complex, in simple understandable language; who in cross-examination turn every opportunity to their advantage, thoroughly routing the opposing legal forces. This guide will not make of you any such superb witness; nor is that its purpose. Rather we think that by enunciating some of the principles growing out of our experiences in the courtroom, we may be able to help you to become a somewhat better witness. Some of these principles you have heard before and some are so obvious as to be almost unnecessary. But we think we can all benefit by their restatement.

Naturally, a witness, to be effective, must make his statements understandable and must have them accepted as truth by the judge and jury. It is not enough that he tell the truth; he must also give the impression of telling the truth. The effectiveness of his testimony is determined not by the statements he makes but by those the judge and jury understand and believe. As the lawyers would put it, it is a question of his clarity and his credibility.

The credibility of a witness is the product of a multitude of factors, not the least important of which are seemingly insignificant personal traits of the witness. Whether a witness is to be believed is a personal determination for the judge and each of the 12 on the jury, all of whom, it should be remembered, are only men and women, subject to human whim and frailty. Try as they will to achieve that perfection in objectivity and fairness which is the goal of our courts, they will almost invariably evaluate a witness principally on the basis of their own personal and subjective standards. It is not surprising, therefore, that intangible and unreasoned elements often shape their appraisal of witnesses. Often these elements have their origin in the appearance and general demeanor of the witness; his attire, how he walks, his posture, how he sits on the stand, how he answers questions, the inflection to his voice, the emphasis in his speech, his facial expressions, his gestures. These and other qualities begin to operate in subtle ways in shaping the jury's appraisal of the witness from the moment he steps up in response to the call of his name. The effect and weight of his testimony will be largely determined by that appraisal.

Besides being truthful and honest, making a favorable impression upon the judge and jury should be the first aim of the witness. It is axiomatic that you can't please everyone. It is equally true that you do not have much control over certain attributes such as face, figure, quality of voice, etc., that nature has bestowed upon you, some of which may not always be appreciated by others of the human race. But there are things we can all do, and many which we should not do, to enable us to make a better impression. The principles enumerated below, set forth as do's and don'ts are the results of our observation in court of some of the things that witnesses have done which redounded to their discredit, and of some of the things, in our opinion, they should have done to make more effective their appearance on the stand and presentation of their testimony. Some may sound a bit farfetched to you and perhaps ridiculous but all are based upon actual court occurrences.

1. While sitting in the courtroom, either as a prospective witness or as an assistant to one of the members of the Administration, United States Attorney, or General Counsel's Office, make yourself as inconspicuous as possible. Facial grimaces at testimony thought adverse to the Government's case, or nods of approbation or approval at testimony particularly favoring the case should be avoided. They could result in censure from the court if observed. Attracting attention to yourself by talking in the courtroom during the proceedings; reading reports, newspapers, and the like; passing notes; rustling papers; passing comments, jokes, or snide remarks about the judge or this or that jurymen, or witness, has its perils. You may impress some but with others you may be less fortunate. You cannot prejudice yourself or the Government if you fail to focus attention upon yourself. Do not sit in groups of more than two or three. Do not engage in conversation. Spread out in the courtroom.
2. Your dress is important. Dress neatly and conservatively. Save your "loud" clothes for a more suitable occasion. The cliché "clothes make the man" was never more applicable than to the witness in the courtroom.
3. Don't be an "impetuous prompter." An impetuous prompter is a person who sits in the courtroom and hears testimony which he believes erroneous and refutable and who rushes through the rail to the United States Attorney, the General Counsel's representative, or the Environmental Protection Agency representative at counsel table to convey his thoughts on the erroneous testimony. While you may have a contribution to make, hold your suggestions until recess or for some other suitable time to transmit them. Even at recess, wait until judge and jury have left before approaching counsel. Remember that if you have found flaws in the opposing case, our lawyers most likely have found them too. It is disconcerting to those at counsel table to have interruptions by witnesses and others in the courtroom who bombard them with suggestions on strategy, etc. In addition to making you conspicuous, it shows you are strongly partisan and does not contribute to the building of a good impression. Jot your ideas down so you will not forget them when you have an opportunity to confer with the U. S. Attorney, member of General Counsel's Office, or others who are directing the case.

## Appearance As Witness

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4. Avoid conversations with principals or witnesses for the opposing side during trial. You never can predict when your statements will be distorted to your disadvantage and perhaps the Government's too. If you cannot avoid conversation with them, confine your remarks to matters other than the trial.
5. During periods of recess keep your guard up. Don't engage in horseplay, wisecracking, or loud conversation, especially about the case. You never know when you are under the observation of the judge or members of the jury. Many a Government witness has found himself embarrassed after making an indiscreet remark in the halls of the courthouse, or in the elevator, or in a nearby lunchroom, or men's room, to learn that the judge or a jurymen or opposing counsel has been in the same hall, elevator, or lunchroom and had seen and heard him. Save your wisecracks for a time and place where the humor in them can be enjoyed without threat of embarrassment to you or the Government. Do not hold loud conversations in the corridor outside of the courtroom while court is in session.
6. Do not rush up to congratulate a Government witness when he steps down from the witness stand. Wait until court has adjourned. Avoid expressing any approval or disapproval of his testimony by glance, nod, or otherwise until leaving the courtroom. If you are an inspector designated to transport a witness to and from the courtroom, be especially careful to meet the witness outside the courtroom, not as he leaves the stand.
7. Avoid legal arguments with the United States Attorney and with General Counsel's representative in presence of the United States Attorney. Save your suggestions on legal points involved until they can be informally discussed with General Counsel representative or with the United States Attorney if no General Counsel representative is on the case. While you may be 100% right as to the law, your suggestions will be more favorably received if not stated as dicta, and if suggested rather than propounded.
8. Don't lose your patience or temper while testifying. A cross-examining attorney often deliberately baits an irascible witness to anger him. Don't let it happen to you. Keep calm and unruffled. Neither your thinking nor your appearance improves with rising ire. Be polite and courteous to everyone, including opposing counsel even if he is insulting.
9. Attorneys questioning you on cross-examination will often try to force a categorical answer out of you, i.e., a "yes" or "no" answer. There is some justification for such attempts because the cross-examiner is permitted to ask "leading questions." If a simple "yes" or "no" answer does not bring out the whole truth, it is your duty to inform the cross-examiner that the question can't be answered "yes" or "no". If you do this, the court may insist on a "yes" or "no" but invariably will allow you to make any needed explanation. You are sworn to give the truth and the whole truth and if a "yes" or "no" answer doesn't do just that, the court will afford protection when it understands the situation because it would not have you violate the oath you took.



## Appearance As Witness

10. Do not insist on sitting at counsel table or inside rail. Wait to be asked. While everyone having knowledge of case could probably be of assistance during trial, the extent of such assistance must be weighed against the impression created by five or six persons sitting and working at the Government's table while only the defendant and his counsel are at the defendant's table.

11. Don't be an "eager beaver". Don't appear to be over-anxious to get something into the evidence that the attorney has not asked for. To do that may suggest that you have a stake in the outcome of the trial.

12. Don't be afraid to admit that you discussed your testimony with representatives of the U. S. Attorney's Office, the General Counsel's Office, or the Environmental Protection Agency. If you are asked the question, state the truth. There is nothing improper in a practical discussion of your testimony with the U. S. Attorney or his Assistant handling the case. Remember that the attorney ordinarily asks the question hoping to catch you swearing falsely.

13. Don't spar with the questioning attorney. Answer his questions frankly, factually, and confidently. Don't engage in a wit-matching contest. Sparring by a witness may suggest that he is evading the question and often detracts from his credibility.

14. Wait for the question to be asked in entirety before you reply. Make certain that you understand it, never attempt to answer a question that you do not fully understand. To do otherwise may lead to trouble and embarrassment. If the witness does not understand all or any part of a question, he may do one or both of the following. He may state, in substance, as follows:

(a) I am sorry, but I do not understand - or, I am not sure that I understand the question, could you rephrase it?

or

(b) If you mean - state what you think the question is, - then my answer is. . .

or

combine (a) and (b) as

(c) I am sorry, but I am not sure that I understand the question, but if you mean. . . then my answer is. . .

15. Don't be afraid or ashamed to admit "I don't know." If you don't know the answer to a question, say so. Don't try to cover up ignorance of some fact or set of facts. If you do, it may suggest evasion on your part.

## Appearance As Witness

16. Wait several seconds before you answer a question put to you in cross examination in order to give the U. S. Attorney an opportunity to object if he regards the question as improper. But avoid undue delays in replying. These delays, particularly with side glances at the U. S. Attorney, may give the impression you are being evasive. Try to speak with the same speed and use the same phraseology on cross examination as on direct.

17. Don't answer any question objected to by either side until the court has ruled on the objection. If the witness has started his answer, he is to stop if any objection is raised by either side and is not to continue until the judge or either counsel indicates that it is proper to continue his response.

18. Don't chew gum while testifying. While chewing may serve to unlimber your tongue, what you say may not go over with intended effect. Remember too, that the jury may have one or more old-fashioned persons in it who think that exercising the jaws in practice chewing should be done in private.

19. Answer each question by spoken words. Don't nod assent or shake your head in dissent. The court reporter is not watching you but is concentrating on his shorthand and notebook. He cannot hear a nod or a gesture. The record of your testimony may be incomplete unless you answer each question with spoken words.

20. Speak as clearly and distinctly as you can. Use simple language. Remember you defeat your purpose if you are not understood, so don't try to impress anyone with a vocabulary of infrequently used words. If the subject is technical and scientific, reduce the terminology you use to an understandable level. If technical words must be used or are used for any reason, the witness should define them as he uses them.

21. Don't hesitate to ask permission to refer to your notes to refresh your recollection in testifying, provided your notes were made at the time of or immediately after the event about which you are testifying. The fact that you cannot recall exact details without notes should not be embarrassing, and, in fact, can be used to the advantage of the Government when it is shown that the opposing party does not have a written record of the transaction. Do not read verbatim long passages from your notes.

22. Come into the courtroom prepared. Know your facts. All pertinent dates and time should be checked. Arrange all documents and exhibits in order so that the testimony will be presented without fumbling.

23. Testify only as to facts about which you have first-hand knowledge. In most instances you cannot testify about what someone told you. That would be hearsay. You can testify about what the defendant told you, if what he told you is relevant to the case.

## Appearance As Witness

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24. In testifying, keep your voice up. Too often judges have to admonish witnesses to speak up. Save him the trouble by striving to have the judge and the whole jury hear what you have to say.

25. Answer only the question asked, but answer it fully and to the point. Don't volunteer unnecessary information. Remember the more you say unnecessarily, the more you suggest to opposing counsel for cross-examination.

26. Unless you are testifying as an expert, don't express opinions or conclusions. State only facts. Don't assume expert knowledge in a field unless you are in fact an expert by reason of your training and experience. Reading an article on a subject does not make you an expert in that subject. If you are questioned on a subject that you have only superficial knowledge of, admit at the first pertinent question that the subject is outside of your field or knowledge.

27. Don't exaggerate. State the facts accurately and don't embellish them. Don't be disappointed if the facts about which you are to testify are not as dramatic as you would like to have them. The court and jury are interested only in getting the unvarnished truth, so give them only that.

28. Be careful when the opposing lawyer reads from a book or document and questions you about what he read. Before answering, ask to see the document he read from. He might be engaging in such deceptive practice as misquoting or only partially quoting.

29. Never bring to the stand notes, files, diaries, or other material for help in your testimony unless you are willing to have the opposing side see them. He has a right to see them.

30. In cross-examination opposing counsel may use the oft employed technique of asking you whether you regard certain persons in the field about which you are testifying as recognized authorities. This is preparatory to asking you whether you agree with certain statements which those authorities made in writings, etc. If your answer is no--that you don't recognize them as authorities, that line of cross-examination cannot be pursued. Unless you definitely have heard of the named persons and are familiar with their works and do recognize them as authorities, don't expose your self by saying that you so recognize them.

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69th Annual Meeting of APCA, June 27 - July 1, 1976.

E-1

ENVIRONMENTAL LITIGATION AND  
THE IN-HOUSE ENGINEER

Frank Finn and Clarke Heidrick, Jr.

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69th Annual Meeting of APCA, June 27-July 1, 1976.

## Environmental Litigation And The In-House Engineer

Environmental litigation is not entirely new to the engineering profession. In the Middle Ages an English engineer was hung for creating a nuisance by burning soft coal in the wrong place at the wrong time. The nuisance concept has served as a tool for the abatement of air pollution ever since.

But, the time-worn nuisance action is being eclipsed in importance by the myriad of new statutes and regulations designed to facilitate air control management. The proliferation of specific governmental regulations in the last decade has created a new world for the engineer. Not only must he turn his attention from the telos of efficient production in order to incorporate substantive environmental concerns, he, most significantly, is faced continuously with the immediate prospect of litigation. For not only do the various state and federal "clean air acts" provide for the promulgation of detailed regulations governing air quality, they provide the mechanism by means of which the agency may swiftly sanction violators through judicial action.

The role of the in-house environmental engineer in the litigation process is an important if not determinative one. The ability of the engineer to acquaint the lawyer with the facts, to assemble those facts in a presentable fashion, and to aid in their presentation is often the touchstone of success or failure in the litigation. Conversely, in order for the engineer to understand this task, it is essential that he understand the judicial setting, and the process into which he will be drawn.

### The Factor Mix

Litigation is simply the process of presenting for judicial determination the legal rights and obligations of the parties before the court. From the standpoint of an industrial source, environmental litigation may take a variety of different shapes depending upon the party complaining, the legal injury asserted by the plaintiff, the nature of the conduct complained of, and the form of remedy sought. The gallery of prospective plaintiffs includes every governmental agency, whether state, federal, or local, with jurisdiction over the defendant's activities, every private citizen affected by the activities of the defendant, and, in some instances, private citizens who are not affected

directly by the defendant. (The "standing" of private citizens to sue on behalf of the public interest has been expanded by recent judicial decisions.) The nature of the legal injury which may be asserted by the plaintiff ranges from the specific--personal injuries and property damage, to the general--the nuisance action for unreasonable interference with the right of the plaintiff to use and enjoy his property, to the etherial--the public interest asserted by the governmental agency. The activity complained of may be a chronic emissions problem or a momentary plant upset. The arsenal of prospective judicial remedies includes money judgments for damages actually sustained by the plaintiff, punitive damages and statutory penalties, as well as injunctions and criminal citations.

### The Legal Issues

Obviously, the legal and factual issues for determination by the judge or jury will differ depending upon the "factor mix" discussed above. In a suit brought by a private citizen for damage sustained by his crops as a result of a momentary eruption, the issues are whether the eruption was the result of negligence on the part of the defendant plant, whether the resulting emissions were the proximate cause of the crop damage, and the monetary value of the crops lost. In an enforcement proceeding brought by a governmental agency, the probable sole issue is whether emissions were or are in excess of applicable standards, without regard to the question of the defendant's negligence in causing the violation or in failing to prevent it. Because of the increasing importance of agency regulation, and the proportionate share of environmental litigation attributable to governmental enforcement actions, this presentation will focus upon the role of the environmental engineer with respect to such proceedings. Many of the observations made here are equally applicable, however, to "private" litigation.

### The Engineer And The Lawyer

Before advising the engineer of the role he is to play in the litigation process, it is essential to touch upon the general relationship between the engineer and the lawyer. There is no doubt that engineers have at times viewed the vageries and unpredictabilities of the legal profession with repugnance. There is no doubt that the insertion of the lawyer and corresponding procedural quagmire into the domain of the engineer is dispossessing. The engineer who once spent his

time as the quarterback--fine tuning the process for maximum efficiency, is converted into a lineman--supplying the lawyer with ammunition. If the change of direction is unwelcome then so be it--but the engineer must remember that he has not the lawyer to thank but the regulatory climate which necessitates the lawyer. The engineer must understand that though the facts may be viewed from his perspective as either black or white, the judicial process operates in shades of gray. If the cooperative venture between the lawyer and the engineer is to operate efficiently, each must recognize the domain of the other with the end of presenting the best possible case constantly in sight.

### Before The Beginning

Every environmental lawsuit begins before suit papers are filed with the court or served on the defendant. Particularly when the complaining party is the governmental agency, and when the nature of the complaint is chronic, environmental "jawboning" by the agency is the familiar tactic. The agency is in a position to monitor compliance with applicable standards and to demand abatement measures as an alternative to litigation. It is at this point that the attorney should be consulted. Too often the first reaction of the engineer upon receiving notice of violation is analogous to that of a motorist who pleads with the patrolman for a warning ticket. He admits his guilt and says he is sorry. No matter how good the working relationship between the engineer and the agency, conciliation is largely unavailing at this point and admissions by the engineer will be devastating to the company when the case is tried.

Once the attorney has been consulted, the prompt evaluation of prospective legal consequences is crucial, and implicit within that evaluation is an engineering analysis of the evidence of violation. If the agency is relying upon its own measurements as opposed to the self-monitoring records of the defendant, the validity of the agency test must be determined by the engineer and any weaknesses or inconsistencies communicated to the agency. On more than one occasion the agency has been persuaded to back off when convinced by the company that the positioning of the agency's high-vol sampler did not produce valid property line samples.

### Interim Relief

In the event that the lawyer and engineer are unable to persuade the agency staff that the company is in



compliance, but are unwilling to accept abatement measures requested by the agency, there is one other avenue left open as an alternative to court action. Often the lawyer will attempt to forestall court action by or on behalf of the agency by requesting a formal proceeding before the agency itself. Many of the state clean air statutes authorize such formal proceedings for the purpose of determining either (1) whether the source is in fact in violation of the applicable standard, or (2) whether special circumstances exist which warrant a "variance" or "exception" which in effect relieves the source, at least temporarily, from the standard of compliance which it is allegedly violating. Typically, the agency may grant to individual sources a "variance" whenever the agency finds the enforcement of the statute or regulation will operate to close a business or take property arbitrarily without the corresponding benefit contemplated by the statute. In the past variances have been most frequently granted shortly after the promulgation of new and more restrictive regulations in order to give the plant an opportunity to get into compliance, or in the instance of unanticipated equipment malfunctions which the plant is seeking in good faith to rectify. Although recent judicial decisions have made variances more difficult to obtain, there are still circumstances which justify the issuance of variances upon proper request.

Compliance and variance proceedings are generally conducted via public hearings before the agency hearing examiner who then recommends action to the agency or board itself. The company, generally, may be opposed at the hearing by any interested person, as well as the staff of the agency itself. The testimony of the engineer is the substance of the company's presentation at the hearing. Typically, the state agency hearing will be less formal than a judicial proceeding, with few, if any, evidentiary restrictions imposed. (At least one state agency, the Texas Air Control Board, has, however, recently adopted procedural rules requiring adherence to the rules of evidence followed in the state courts.)

The ultimate decision of the board or agency upon the matters in issue at the hearing is largely within its own discretion, and thus, judicial review of agency action is frequently extremely limited. The usefulness of the formal administrative proceeding is also limited by a second element of discretion customarily placed in the hands of the agency by statute. Generally the right to administrative hearing prior to the filing of a lawsuit against the company is solely within the discretion of the agency. In many

cases the executive director of the board or agency may conclude from the data collected by his staff that the formal agency proceedings requested by the company are not necessary, and elect to pursue the matter directly in the courts. Even if the agency grants a variance, in most cases that variance will operate only prospectively, and thus the agency is free to proceed in the courts to recover statutory penalties for violations of applicable standards prior to the granting of the variance.

### Suit Is Filed

In the event that the agency and the company are unable to resolve their problems either through negotiation or formal agency proceeding, a lawsuit can be expected. Usually the legislation authorizing the state agency with jurisdiction over air pollution matters to file suit requires that suit be brought either in the county where the defendant company has its principal place of business, or in the county in which the specific violation with which the defendant is charged has occurred. Suit is initiated simply by filing the suit papers with the appropriate court ("pleadings") and by having the sheriff of the county in which the defendant company resides serve the papers personally upon the proper officer of the defendant company. The agency is required to set forth in the pleadings the precise nature of the complaint against the defendant including the particular statute or regulation violated, the particular action on the part of the defendant which violated the statute or regulation, and the specific relief which the agency is requesting from the court. On receipt of the suit papers, if the lawyer has not been consulted already, he should be immediately consulted. No communications should be ventured on the part of the defendant without the advice of counsel.

From the date upon which the suit papers are served upon the company it generally has a period of twenty to thirty days to file its own pleading in response-its answer. In many states, the responsive pleading need only include a general denial of all of the allegations in the agency's pleading in order to put each in issue at trial. (The Federal Rules of Civil Procedure require the defendant to specifically admit or deny each of the allegations contained in the agency's complaint, and provide that allegations not specifically denied will be deemed by the court to be admitted.) Generally, however, the defendant will want to raise as soon as possible, either in its original answer, or by amendment to that answer, all of the defenses which it may have to the lawsuit filed against it by the

agency. These defenses may include, aside from the specific denial of violation, that the regulation, the violation of which is charged, is not authorized by the clean air statute, or, if authorized by the statute, is violative of the state or federal constitution. (In the past year, at least two opacity regulations have been attacked in this way, but without success.)

Similarly, the defendant may raise as technical defenses that the agency has failed to comply with its own rules and regulations with respect to certification of the lawsuit to the state attorney general, or that it has failed to properly notify the defendant or consider the violation administratively prior to certification. While these technical defenses will not affect the ultimate outcome of the lawsuit, when timely and properly raised by the defendant, the court may "abate" the lawsuit until the agency has properly complied with its own regulations. The delay caused thereby may be extremely valuable to the defendant from the standpoint of allowing it time to discover the cause of its emissions problems and correct them, or, more importantly, may postpone the agency's access to the most potent enforcement weapon available to it-the preliminary injunction.

#### The Preliminary Injunction

Upon trial of the lawsuit on its merits, in the event of a finding by the court or by the jury that the defendant is or was in violation of applicable standards, the relief which may be awarded in favor of the agency is substantial. The civil penalties provided for under clean air statutes may amount to hundreds of thousands, if not millions, of dollars. The court may enjoin the defendant from further violating the standard found to be applicable and require it to implement abatement measures which may again cost the company a considerable sum. However, the ultimate trial of the case on its merits may, depending upon the docket of the court in which the case is pending and the statutory authority of the agency to obtain an early ("preferential") setting, occur months, if not years, after the case is initially filed. Because of the delay inherent in the judicial process, the most debilitating relief available to the agency is the temporary or preliminary injunction. Typically the agency will, in the initial pleading, request the court to grant a preliminary injunction, and ask that the court hold a hearing on the issue of the preliminary injunction immediately. In some instances the hearing is

held within a week of the filing of the petition, and in the event the agency prevails, the court will order the defendant to discontinue violation pending a full determination of the case at trial. Where the defendant is experiencing frequent mechanical upsets which cause it to be in violation of pollution standards, and is unable to ascertain the cause of the upsets or to correct them, it must choose between shutting down the plant completely or continuing to operate with the substantial possibility of further upsets and thus being in contempt of the court's order. Because contempt citations may have the unpalatable effect of landing the plant manager and other responsible corporate officers in jail, the usual result is the complete cessation of the operations at the plant.

The issues for determination at the preliminary injunction hearing are essentially whether or not the plaintiff agency can make a prima facie showing of past violation coupled with a showing of probable future violation. An interesting legal question, which is still a matter of controversy in the courts, is whether the court must additionally consider the public benefit to be derived from the continued operation of the plant in ruling upon the temporary injunction. The agency will almost always take the position that no "balancing of the equities" is required for the temporary injunction to be entered. The defendant, on the other hand, may attempt to present to the court evidence of its economic benefit to the community in terms of the number of the persons which it employs, the taxes which it pays to local government, and the effect of a plant shutdown on those who consume its product.

While the engineer is not directly involved in the "balancing of the equities" from the standpoint of developing evidence demonstrating the economic benefits of the plant to the community, the role of the engineer in developing evidence rebutting the agency's case with respect to violation itself is crucial. The engineer must prepare within the extremely short period prior to the temporary injunction hearing his own evidence with respect to compliance. It may be necessary for the engineer to employ in the interim an independent consultant in order to lend credibility to the figures which will be produced at the hearing on the part of the company and to their interpretation. Relevant evidence would include not only figures which demonstrate that the company is not in violation of applicable pollution standards, but also evidence showing that even if the company was in violation of pollution standards, that violation was caused by a specific malfunc-

tion which has now been cured, or which is unlikely to occur again. One of the most effective methods for demonstrating the small likelihood of future occurrence is to present to the court at the hearing a detailed plan formulated by the company and calculated to prohibit major upsets in the future.

### Discovery And Preparation

After the suit has been filed and the defendant has answered, the litigation enters its second, and perhaps the most important, phase--discovery. Discovery, in the strict sense of the word, is the process provided under the procedural rules by means of which the parties may obtain from each other relevant evidence. From the standpoint of the defendant source this process is logically divisible into two functions--the protective function, and the offensive function.

The protective function is one of guarded compliance with applicable law in supplying the agency with the evidence it is entitled to discover. The agency may be expected to utilize the methods available under the procedural rules to obtain every stick of evidence in the possession of the defendant which might be useful to it in the presentation of its case. These methods include onsite visits, written interrogatories to the defendant, written requests that the defendant admit certain facts to be true, the oral depositions of various employees and officers of the defendant, and requests that the defendant produce various documents and tangible evidence for examination.

Generally, parties to a lawsuit may discover through the various procedural devices, any material or information in the possession, custody, or control of the other party which is relevant to the subject matter of the lawsuit. However, there are some basic limitations governing the bounds of discovery with which the engineer should be familiar. The most important such limitation from the standpoint of the defendant protects from discovery materials prepared in anticipation of litigation by the party, its employees, its attorney, consultants, or insurers. The underlying rationale for this rule is that a party would be seriously hampered in preparing for trial if its employees, lawyers, and other representatives could not commit to writing summaries of witnesses' statements, legal briefs, and organizational materials and evidence gathered in anticipation of trial without fear of having the other side obtain

copies by court order. Without the work product rule, one party to the lawsuit could allow the other to run all the tests, get all the witnesses' statements, and hire all the consultants, and do no discovery of its own other than to obtain copies of its opponent's work. (The rules applied by the federal courts permit discovery of work product by a party showing to the court that it has a substantial need for the evidence, and that it is unable to obtain the equivalent by its own efforts.)

From the standpoint of the environmental defendant the work product rule will usually protect the results of testing done after suit has been filed, and the opinion and reports of both in-house and consultant experts based on those tests. There is, in effect, an exception to the work product exception which permits the discovery of reports prepared by experts who will testify at trial and all of the facts and information underlying those reports. Because, however, it is unlikely that an expert, whether he be in-house or consultant, who produces an unfavorable finding will be called as an expert witness at trial, it is often possible to protect unfavorable test results from discovery by the agency. (Of course, where the applicable statute requires that the company regularly monitor its own emissions and report to the agency, such reports are not prepared in anticipation of litigation, and must be continued notwithstanding the advent of litigation.)

Another limitation upon the judicial policy of liberal discovery is the attorney/client privilege. The privilege is similar to the work product exception in that it protects communication of a confidential nature between the attorney and his client from discovery, but differs from the work product rule in application. The work product exception applies to communications between employees or other representatives of a party whether they be legal counsel or otherwise, so long as they relate to the litigation. The privilege applies only to the communications of a confidential nature by the party or its employees with the lawyer, but applies even if those communications are not specifically related to the litigation or if they are made prior to the occurrence of the facts or circumstances giving rise to the litigation.

For example, a letter from the in-house engineer in the home office to the attorney on March 1, 1976 indicating that the electrostatic precipitator is malfunctioning and that the plant was in violation of applicable pollution standards would in all probability not fall within the work product exception if suit is not filed until April 1, 1976

and if the agency does not seek relief for violations occurring in March. The letter would, however, fall within the attorney/client privilege.

On the other hand, the letter from the home office engineer to the vice president of April 5, 1976 advising that the engineer has run his own test for the purpose of rebutting the violations alleged in the agency's pleading but is unable to confirm compliance will in all probability be work product. The letter would not come within the attorney/client privilege. (If the lawyer is copied on such correspondence however there is a good chance that the attorney/client privilege might be invoked as an additional ground in order to protect the letter from discovery.)

It is with these basic limitations in mind that the lawyer and the engineer will facilitate the response of the defendant to the various discovery devices employed by the agency and its counsel. Customarily the agency will initially employ written interrogatories to the defendant calculated to ascertain the basic position which the defendant will take at trial, the names of the expert witnesses who will be employed by the defendant at trial, and other general information about the defendant's plant and record keeping. The agency may next be expected to request a court order directing the defendant to turn over all of the documents, records, and correspondence relevant to the lawsuit, followed by the depositions of the employees of the defendant and its declared experts.

"Protective discovery" generally takes the form of an initial assimilation by the engineer of all of the evidence and information even arguably responsive to the inquiries of the agency. The lawyer will then review the engineer's suggested responses to interrogatories and requests for production from the standpoint of legal protectability. It is thus easy to see why "protective" discovery from the standpoint of the engineer is less than appetizing. The impact of the agency's utilization of the various discovery techniques is to impose upon the engineer a mountain of tedious paperwork, all of which is subject to review by the lawyer.

While the function of the engineer in responding to agency discovery probes after suit is filed is not likely to appeal to his creative instincts, he can learn from the experience valuable lessons about the impact of his company's record keeping system and communication procedures upon subsequent litigation. Clearly, almost all of the

records kept by the engineer in the course of his day to day operations will be discoverable within the limitations discussed above. Similarly, even if the company and the agency are on friendly terms, it should be noted that all written communication by the company with the agency may be available not only to the agency but to private litigants under open record statutes whether or not there is subsequent litigation.

In light of the above principles, the engineer might keep in mind three basic rules. First, the records and communications which are likely to end up in the hands of the agency must be accurately phrased and should contain nothing other than what is necessary to accomplish the business purpose. Often it is not the measurements or technical data in the company's records which hurt it at trial. Rather, the unscientific notation on the back of the engineer's report stating "she was blowing and going-and dust all over six counties" may disintegrate the case. Second, whenever possible written communications should be phrased in a manner which will bring them within the "work product" exception. If a letter bears upon a matter which is, or may subsequently be, the subject of litigation, it should be addressed to that prospect, and not merely take the form of another daily record. Third, the engineer should see that his company's compliance with applicable pollution regulations is fully documented in the company's records. Too often, even though the company is in compliance a majority of the time, its records will reflect only upsets and violations, and the true picture will not be presented to the court.

Turning from the records and documents of the defendant which are discoverable by the agency, obviously the defendant company will conduct its own "offensive discovery" simultaneously with that of the agency. The purpose of the defendant's discovery is to carefully define and to delimit the position for the agency at trial, and to determine exactly what data and analysis it will rely upon. The engineer can be of great help to the attorney in formulating interrogatories and requests for admission calculated to perform this function. Similarly, the agency will have in its possession a large amount of data relevant to the lawsuit. The engineer will be familiar with the information and records kept by the agency, and will be able to help the lawyer in formulating his requests for production of documents by the agency.

Once the defendant has obtained all of the relevant data underlying the contentions of the agency, and the



opinions and underlying analysis of each of the experts who will testify at trial against the defendant, then it is the task of the engineer to analyze the agency's position and to aid the lawyer in the preparation of the defendant's evidence. This task will occupy the bulk of the time spent by the engineer on the case.

The preparation of the defendant's case includes not only an analysis of the plaintiff's evidence, so that the attorney may effectively cross-examine the plaintiff's witnesses, but also the assimilation of rebuttal evidence including independent tests, and outside analysis by various experts. Depending upon the size and complexity of the lawsuit expert testimony will be required on the issues of the impact of the various contaminants upon the general health of the community, upon vegetation, upon houses, upon automobiles, and upon real estate values. Expert testimony may also be required with respect to the operation of the defendant's plant, its abatement equipment, and basic operating procedures, as well as the economic and social benefits of the plant to the community. In most cases it will be the task of the in-house engineer to seek out qualified experts where necessary and to coordinate their efforts in preparing for trial. Ultimately the engineer must be thoroughly familiar with the knowledge and capabilities of each expert so that he may advise the lawyer at trial.

Similarly, the engineer will be responsible for developing the most effective method by means of which the defendant's technical data may be presented to the judge or jury. Often graphs, tables, or photographs are most suitable for this purpose, and it may be necessary for the engineer to employ a graphics company to prepare the data in the form which lends itself most readily to comprehension by the layman.

Further, once the agency or its counsel have made known to the defendants the experts will testify at trial, the task of investigating that expert befalls the engineer. Often articles written by the expert prior to the lawsuit, or testimony given by the expert in previous lawsuits, may be used by defense counsel during cross-examination to undercut his opinion.

#### Trial Of The Environmental Lawsuit

Generally the trial of an environmental lawsuit commences soon if not immediately after the completion of

discovery. The clean air statutes of some states permit the agency to seek a "preferential setting" from the court. The actual trial of the lawsuit may last, depending upon its complexity from one day to literally months. Usually the trial will consist of a battle between the agency's data and the defendant's data as interpreted by the expert witnesses.

The agency, being the party with the burden of proof, will present its case first. Generally, the first witnesses presented by the state will be "fact" witnesses--those persons who have firsthand knowledge of the defendant's conduct. These witnesses will include the agency personnel who ran the test and collected data upon which the state will rely, and, depending upon the issues at trial, perhaps surrounding landowners and residents who can testify to the effect of the defendant's emissions on their houses, cars, crops, bodies, land values, etc. The agency will introduce into evidence the data which its employees have collected after the employees have laid a proper foundation for its admission through testimony relating to the manner in which the data was collected, recorded, and transmitted into the form in which it appears in the courtroom. When the defense attorney is given the opportunity to cross-examine, if he has been prepared properly by the engineer, he will obtain admissions from the agency witnesses concerning the manner in which their tests were run which will later undermine the opinion of the agency's expert with respect to the validity of the data as evidence of violation and which will support the theory of his own expert as the invalidity of that data.

After the state has put on its fact witnesses, it will present the testimony of its expert witnesses (almost invariably another agency employee). The state's experts will testify that in their opinion, based upon the facts as stated by the fact witness, the data collected by the agency is valid, and that, based upon that data, they are of the opinion that the defendant was in violation of the applicable standards on the occasion in question. The defendant's attorney will, on a cross-examination, possibly build upon his earlier cross-examination the state's fact witness and attempt to narrow the opinion of the expert by narrowing the facts upon which it is based. He may also attempt to obtain an admission from the expert that the data which the defendants will subsequently introduce into evidence would lead that expert to the opinion that the defendant was not in violation at the times in question. Whatever be the tack of the defense counsel, however, he will need the technical support throughout of the engineer. It is often helpful for the

engineer as he listens to the testimony of an agency witness to write appropriate questions for cross-examination, which the lawyer can consider.

When the state has completed its case, the defense will then put on its own fact witnesses and experts to rebut the state's evidence. Frequently the order in which the defendant's witnesses testify, and indeed which witnesses will testify and which will not, is not determined until after the state has put on its case. The evaluation by the engineer of the strengths and weaknesses of potential defense witnesses is often determinative of these questions. Once the defendant's witnesses have testified, and the argument of counsel concluded, the case is of course submitted to the jury or judge for decision.

### Conclusion

It is impossible to depict in an overview the "average" environmental lawsuit. It is hoped that this overview from the standpoint of the engineer serves to identify areas appropriate for cooperation between the engineer and the lawyer, and that it will serve as a starting point for the uninitiated.